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PASCAGOULA RIVER COMPREHENSIVE BASIN STUDY. VOLUME VI. APPENDIX--ETC(U)
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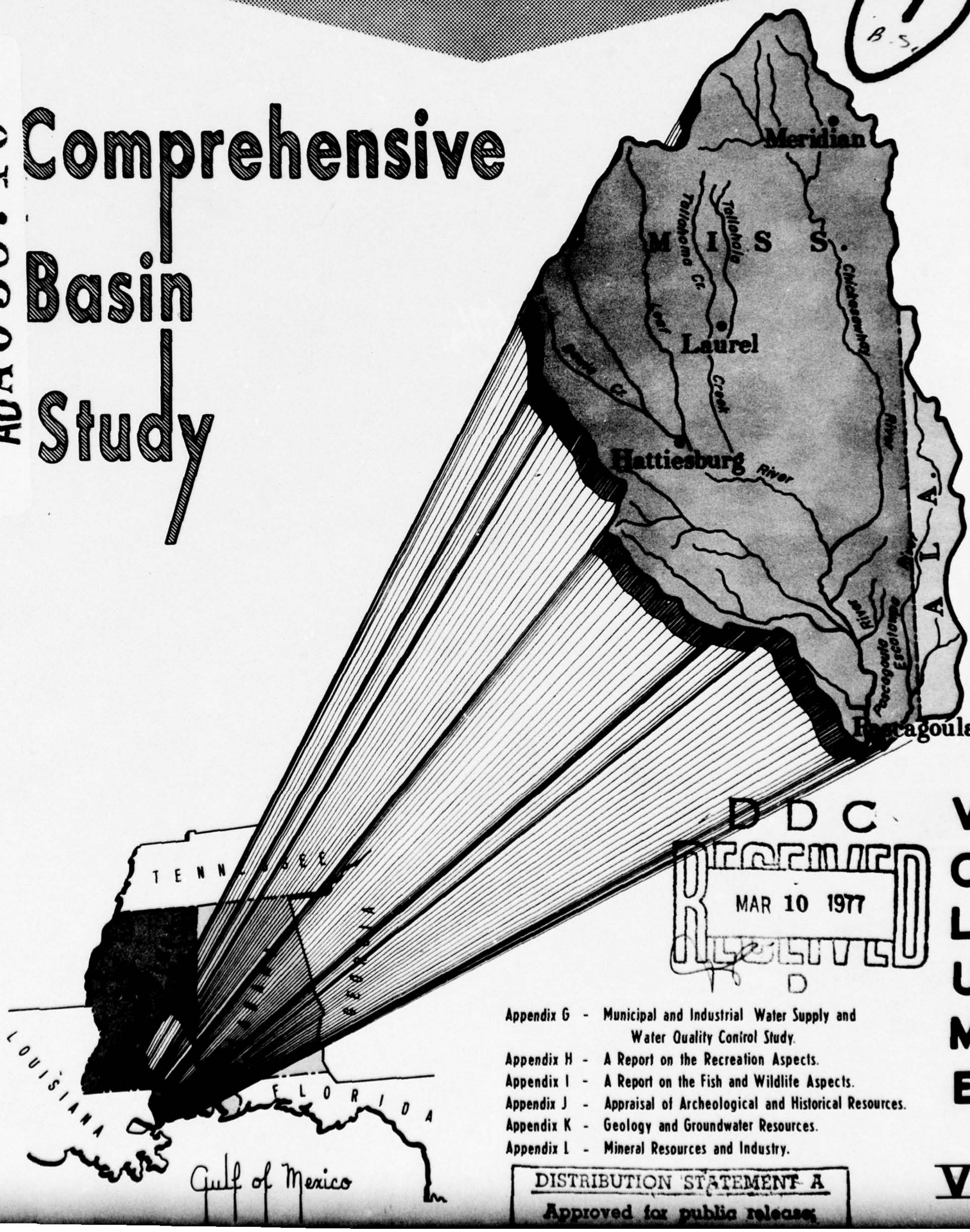
PASCAGOULA RIVER

Comprehensive Basin Study



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PASCAGOULA RIVER COMPREHENSIVE BASIN STUDY

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PASCAGOULA RIVER COMPREHENSIVE BASIN STUDY.
Volume VI.

APPENDIX G, H, I, J, K, L.

MUNICIPAL AND INDUSTRIAL
WATER SUPPLY AND WATER QUALITY CONTROL STUDY
PASCAGOULA RIVER BASIN
MISSISSIPPI AND ALABAMA

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Prepared by the Federal Water Pollution Control Administration,
Department of the Interior, as a contribution to the
Pascagoula River Comprehensive Basin Study

MUNICIPAL AND INDUSTRIAL
WATER SUPPLY AND WATER QUALITY CONTROL STUDY
PASCAGOULA RIVER BASIN
MISSISSIPPI AND ALABAMA

Abstract

The results of this study show a need for storage for municipal and industrial water supply at three of five reservoirs proposed for early action and for water quality control at two of these. These conclusions are based on economic, demographic and engineering studies. Future needs are based on projected population and industrial growth.

Prepared for
the Pascagoula River Comprehensive
Basin Study

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U. S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION,
SOUTHEASTERN COMPREHENSIVE WATER POLLUTION CONTROL PROJECT
SOUTHEAST REGION ATLANTA, G~~EORGI~~A
February 1967

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I. INTRODUCTION

Authority

Following the 1961 report of the Select Committee on National Water Resources (1)* and subsequent Executive Branch actions, investigations of the Department of the Army and the Department of Agriculture in the Pascagoula River Basin were converted to a comprehensive Type II study. Participation of the Department of the Interior, the Department of Commerce, the Federal Power Commission and the Department of Health, Education and Welfare was then established. The study is being coordinated by the Department of the Army through its Corps of Engineers, Mobile District.

The Department of Health, Education and Welfare participated in this coordinated study through its Southeastern Comprehensive Water Pollution Control Project which includes the Pascagoula Basin along with eight other major Southeastern basins in its study area. The water supply portion of this report was prepared in accordance with the Memorandum of Agreement, dated November 4, 1958, between the Department of the Army and the Department of Health, Education and Welfare relative to the Water Supply Act of 1958, as amended (43 U.S.C. 390b). The water quality control aspects are considered under authority of the Federal Water Pollution Control Act, as amended (33 U.S.C. 466 et seq.). Responsibility for most of these activities was transferred from the Department of Health, Education and Welfare to the Department of the Interior by Reorganization Plan No. 2 of 1966, effective May 10, 1966. An inter-departmental agreement signed by the President September 1966 specified the cooperative activity of these two departments.

Purpose and Scope

The purpose of this report is to present, as a part of a comprehensive study of water resource of the Pascagoula River Basin being coordinated by the Corps of Engineers, Mobile District, the following:

1. An appraisal of the quantity and quality of water resources in the Pascagoula River Basin,

2. Present and future demands for municipal and industrial water supplies,

3. Present and prospective needs for, and values of, stream regulation for water pollution control and public health,

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* Figures in parentheses indicate a reference. References are listed in Section X.

4. Minimum stream flows required to maintain the required water quality, and

5. Need for, and value of, storage for water supplies and stream flow control.

This information has been developed in detail for those areas which would be or could be affected by reservoirs proposed for the Escatawpa River at Harleston, Tallahala Creek above Laurel, Bowie Creek near Sanford, Oakohay Creek near Mize and the Leaf River near Taylorsville. All of these sites are in Mississippi.

This comprehensive study is being made by a group composed of the U. S. Army Corps of Engineers, the Department of Agriculture, the Department of Commerce, the Federal Power Commission, the Department of the Interior, the Department of Health, Education and Welfare, the Department of Transportation, and the States of Alabama and Mississippi. The study, of which this report is a part, is to provide a plan to satisfy the basin needs for navigation, water supply, flood control, recreation, pollution abatement, hydroelectric power, irrigation, fish and wildlife conservation, land treatment and upstream watershed control, as applicable, projected to the years 1980 and 2015.

Acknowledgements

Information and assistance were obtained from the following agencies and is gratefully acknowledged:

U. S. Army Corps of Engineers, Mobile District
U. S. Geological Survey, Jackson, Mississippi
U. S. Geological Survey, Tuscaloosa, Alabama
U. S. Department of Agriculture
U. S. Bureau of Mines
Mississippi State Board of Health
Mississippi State Game and Fish Commission
Mississippi State Board of Water Commissioners
Mississippi Marine Conservation Commission
Pat Harrison Waterway District

The Jackson County Health Center and the city of Hattiesburg made sites available for the mobile laboratory used for the survey and extended other courtesies. Valuable assistance was rendered to the Project by various county and municipal officials and industrial establishments throughout the basin.

II. SUMMARY OF FINDINGS AND CONCLUSIONS

Findings.

1. The Corps of Engineers has under study, as part of its responsibility in the project, sixteen sites in the basin for multipurpose reservoirs. Five of these reservoirs are proposed for early action. The remaining eleven are potential sites to be studied in detail in the future as a need arises. The early action sites are: on the Escatawpa River near Harleston, on the Leaf River near Taylorsville, on Oakohay Creek near Mize, on Bowie Creek near Hattiesburg and on Tallahala Creek above Laurel.

2. The study area covered in this report is the entire Pascagoula River Basin which comprises all or part of 22 counties in southeast Mississippi and parts of three counties in southwest Alabama. For convenience the area has been divided into the Leaf River sub-basin, the Chickasawhay River sub-basin and the Lower Pascagoula sub-basin. The drainage area of the whole basin is about 9,700 square miles.

3. The 1965 population of the study area is estimated at 397,900 of which 46,900 are rural-farm. There is a considerable rural-nonfarm population.

4. The total fresh water use in the basin is about 126 mgd not considering a large scale cooling water use. About 66 mgd of this is from surface sources. The greatest number of individual supplies, however, is from ground-water sources from which some 60 mgd are drawn.

5. The average daily use from municipal water supplies in 1965 was 28.8 mgd to serve a population of 220,000. The average per capita use from municipal supplies was 130 gallons per day. The daily consumption in the rural population is less than this figure. These figures do not include the city of Mobile, which although not in the basin takes 33.5 mgd from a reservoir on a tributary of the Escatawpa River.

6. Significant water use by industry amounts to 86.2 mgd. In addition to this a power plant at Petal uses 75 mgd for cooling and a manufacturer in the Pascagoula area uses 250 mgd of sea water as a source of magnesium, and industries at Mobile use 66.5 mgd.

7. There are four major water using centers in the basin. These correspond to the basin's population centers and are Hattiesburg, Laurel, Meridian and the Pascagoula-Moss Point complex. The combined municipal and industrial use of fresh water in these four is about 105 mgd, exclusive of water used by the previously mentioned power plant for cooling.

8. The major waste discharges are from the four centers of population. At the time of the survey Hattiesburg discharged a residual load with a P. E. of 158,000, most of which was from untreated discharges. The Laurel-Ellisville area discharged municipal wastes with a P. E. of 20,000 and an untreated industrial load varying from a P. E. of 142,000 to more than 12 million to Tallahala Creek. The Meridian area discharged wastes with a P. E. of 47,500 to Sowashee Creek, a tributary to Okatibbee Creek. The Pascagoula-Escatawpa estuary receives a winter load in excess of 455,000 P. E. and a summer load in excess of 630,000 P. E. of which only a small part has received treatment. Hattiesburg and Laurel have reduced their municipal waste load since the survey by 54,900 P. E. and 10,800 P. E. respectively.

9. Salt brine discharges pose a problem in the Leaf, Chickasawhay and Escatawpa Rivers. Discharges of phenols may pose a problem in the near future on the Leaf below Hattiesburg and on Black Creek should use be made of the waters of the latter by a municipality or an industry.

10. Water quality in the Leaf River below Hattiesburg is impaired. Below Laurel and Ellisville, Tallahala Creek is useless for any use other than the transport of wastes. Okatibbee Creek is seriously damaged below Meridian and the upper reach of the Chickasawhay is adversely affected. The Escatawpa River estuary is devoid of fish and other aquatic life for about six months of the year and the Pascagoula River estuary is also damaged in this period. Bacterial pollution is significant in each of these reaches and Pascagoula Bay is closed for the harvesting of shellfish because of its poor sanitary quality.

11. Other reaches of the rivers and their tributaries are in good condition and suitable for most water uses. In practically all sampled reaches of the basin total and fecal coliform densities were found to be above the limits generally accepted for water contact sports and often above those considered satisfactory as a source for domestic water supplies. Organisms of the coliform group gain access to water from several sources including excretions from man, other warm-blooded animals, and birds. At the present time, no satisfactory method is available for differentiating fecal coliform organisms of human and other animal origin. The possibilities of disease transmission to humans are primarily limited to organisms originating in waste from man. However, in recent years it has been shown that feces originating from other warm-blooded animals contain organisms which are dangerous to man. Thus, reports of concentrations of coliforms or fecal coliforms should be interpreted with a knowledge of the possibility of sewage or agricultural pollution and tempered with a degree of judgement.

12. Ground water is plentiful and of good quality throughout the basin with the exception of the Pascagoula area.

Conclusions

1. The 2015 population of the basin is projected to be 951,200 of which only 21,400 will be rural farm. The population of the economic complex, which includes interdependent Harrison County (not physically in the basin), will be 1,290,000 by 2015, of which 23,000 will be rural farm.

2. Based on the economic projections the four areas expected to develop will have the following water requirements by the year 2015:

Area	Municipal	Industrial	Total
Hattiesburg	11.5 mgd	172.5 mgd	184 mgd
Laurel-Ellisville	16	29	45
Meridian	15.7	9.2	24.9
Pascagoula-Moss Point	39	305	344

3. The 2015 water needs of these four areas cannot be met economically solely with ground water. Projections show that storage will be needed in the proposed early action reservoirs to supply the following requirements:

Reservoir	Requirement
Bowie Creek	30 mgd
Tallahala Creek	45 mgd
Okatibbee Creek	25 mgd
Harleston	100 mgd

4. Three areas in the basin will require streamflow regulation for water quality control in addition to adequate treatment of wastes in order to maintain a minimum of 4 mg/l of dissolved oxygen. The required draft-on-storage for the Laurel and Meridian areas and the available storage for the purpose at Pascagoula are as follows:

Reservoir	Area	Draft on Storage (Acre-feet per year)
Tallahala Creek	Laurel-Ellisville	13,650
Okatibbee Creek	Meridian	21,300
Harleston	Pascagoula-Moss Point	228,500 (maximum available. Will care only for present wastes after treatment)

5. The annual benefit of water supply storage in the Corps of Engineers projects, estimated by the least-cost alternative method, is as follows:

Bowie Creek	$109,000
Tallahala Creek	$164,000
Okatibbee Creek	$102,000
Harleston	$460,000

These values include annual operating and maintenance costs.

6. Storage of water for water quality control in connection with adequate treatment of wastes and control of agricultural pollution where necessary will improve some 150 miles of stream and the waters of an estuary. Benefits will include the enhancement of recreational opportunities, the increase in fresh water sports and commercial fishing, an important return to productivity of a large portion of the Pascagoula-Escatawpa estuary, and an increase in the aesthetic value of the basin's waters.

7. The annual present value of storage for water quality control in the Corps of Engineers projects, estimated by the least-cost alternative method, for each reservoir is as follows:

Tallahala Creek	$233,000
Okatibbee Creek	$ 98,700
Harleston	$940,000

III. DESCRIPTION OF STUDY AREA

The Pascagoula River Basin comprises most of southeastern Mississippi and a small part of southwestern Alabama. It is bounded on the north and west by the Pearl River Basin, on the east by the Mobile River Basin, on the southeast by the basins of the Biloxi and Wolf Rivers, and on the south by Mississippi Sound. A vicinity map, Appendix VIII, Exhibit 1, shows the whole basin in relation to the States of Mississippi and Alabama. Exhibits 11, 12, and 13 are fold-out maps showing the three sub-basins of the study area.

This basin is roughly oval in shape with a maximum length of 164 miles, a maximum width of 84 miles, and an area of about 9,700 square miles. It lies in the physiographic province known as the Gulf Coastal Plain. This province is further divided into four regions; the North Central Hills, the Jackson Prairie Belt, the Long Leaf Pine Hills, and the Coastal Pine Meadows. Elevations in the basin range from sea level in the Coastal Pine Meadows region to about 700 feet above mean level in the North Central Hills region. Topography is rugged in the northeast corner of the basin but generally rolling to flat in the remainder of the area.

The basin has a temperate, humid climate with short, usually mild winters and long warm summers typical of the Gulf Coast region. The normal annual temperature for the basin is 66 degrees Fahrenheit, varying from 64 degrees in the upper portion to 68 degrees near the coast. The mean temperature for the basin during January, the coldest month of the year, is 51 degrees and during July, the warmest month, 82 degrees. Severe cold spells are infrequent and freezing temperatures, although they occur often, are of short duration. Extreme temperatures recorded in the basin are a high of 109 degrees and a low of -5 degrees Fahrenheit.

Rainfall in the basin is heavy and, in general, well distributed throughout the year. There is some seasonal variation, with the heaviest rain usually occurring in the winter and spring and the lightest during the fall. The average annual precipitation over the basin is about 58 inches, of which 26 percent occurs in the winter, 29 percent in the spring, 27 percent in the summer and 18 percent in the fall. Usually March and July are the wettest months and October is the driest. During the winter and spring, runoff is about 50 percent of the precipitation. During the summer and fall it is less than 10 percent of precipitation. The area is subject to hurricanes which cause intense rainfall and high tides on the coast.

Prolonged droughts seldom occur in the basin, with excessive rather than insufficient rainfall being more common.

The Pascagoula River is formed by the confluence of the Leaf and Chickasawhay Rivers near Merrill, in George County, Mississippi. (See Exhibit 13) It flows south about 81 miles from this point to

Mississippi Sound. About 37 miles above its mouth, it enters the lower coastal plain and is generally deep and sluggish from there on downstream. At about 18 miles above its mouth the Pascagoula divides into the Pascagoula River and the West Pascagoula River. These two rivers are interconnected by a maze of bayous as they flow to the Sound. For the first 70 miles or so the river flows through a wooded flood plain and for the remaining distance through marsh. Tidal effects are felt upstream from the mouth during low water to at least 42 miles but not over 53 miles. Salt water has penetrated as far as mile 17 during hurricane tides but penetration beyond mile 17.5 would be a rare event that would be the result of a high tide occurring simultaneously with low river flow or of an extremely low river flow. Such a condition existed in October 1963 when the salt front reached mile 20 (2). About 30 percent of the time the salt front is below mile 8: about 40 percent of the time, below mile 9: about 55 percent of the time, below mile 11.5; and about 89 percent of the time, below mile 15 (3).

Below Merrill, the Pascagoula River has two important tributaries in addition to the Escatawpa River. These are Red and Black Creeks with a combined drainage area of 1,242 square miles.

The Escatawpa River, which joins the Pascagoula River in an estuary common to both, has its headwaters in Washington County, Alabama. (See Exhibit 13.) It has a length of about 111 miles of which 56 are in Alabama. The Escatawpa drains an area of about 1060 square miles. Big Creek, Jackson Creek, and Franklin Creek are important tributaries. The maximum penetration of salt water from Mississippi Sound has been observed at mile 15.5 at a time of low flows and a high tide. An extremely high tide such as those which accompany hurricanes would have forced the salt front further upstream. About 40 percent of the time the salt water front will be below mile 7; about 55 percent of the time, below mile 11; about 85 percent of the time, below mile 12.5, and more than 99 percent of the time, below mile 16.

The Leaf River (See Exhibit 11) rises a few miles south of Forest, Mississippi, and flows generally south for about 90 miles where it joins the Bowie River at Hattiesburg. It then flows southeasterly about 71 miles to its confluence with the Chickasawhay River near Merrill. The drainage area of this basin is 3,580 square miles. Principal tributaries are Oakohay Creek, Bowie River, Tallahala Creek, Bogue Homo Creek and Thompson Creek.

The Chickasawhay River is formed by the Chunky River and Okatibbee Creek in Clarke County, Mississippi, just south of Meridian (See Exhibit 12). It flows for approximately 164 miles in a southerly direction to join the Leaf River near Merrill, Mississippi, draining an area of about 2,970 square miles. Principal tributaries are Bucatunna Creek and Big Creek.

Drainage characteristics (See Table 1) of the tributaries of the Pascagoula are representative of streams in the Gulf Coastal Plain.

They vary in character from those with steep gradients and narrow valleys in the North Central Hills and the Jackson Prairie Belt to those with more moderate gradients in the Coastal Pine Meadows region.

The flow in the small upstream tributaries is variable, ranging from very low to large flood flows of short duration. In the upper areas of the basin runoff is rapid and the Leaf and Chickasawhay Rivers have rapid rises in their upper reaches. More sustained flows are observed, however, in the lower reaches and in the Pascagoula River.

Sediment discharges vary widely but changes in the agricultural economy in the past twenty years have resulted in a relatively low amount of sediment entering the stream system.

TABLE 1

DRAINAGE CHARACTERISTICS OF PRINCIPAL STREAMS
Pascagoula River Basin (4)

PASCAGOULA RIVER TRIBUTARIES

Stream	Drainage area (sq. mi.)	Length (mi.)	Average fall (ft./mi.)
PASCAGOULA RIVER			
Escatawpa River	1,060	114	1.75
Red Creek	478	93	3.20
Black Creek	764	122	3.23
Leaf River	3,580	160	2.10
Chickasawhay River	2,970	164	1.20
HEADWATER TRIBUTARIES			
LEAF RIVER			
*Bowie Creek	665	47	4.94
Oakohay Creek	250	57	3.44
Tallahala Creek	649	105	2.28
Bogue Homo Creek	422	63	5.49
Thompson Creek	236	45	6.22
CHICKASAWHAY RIVER			
Chunky Creek	544	41	4.39
Okatibbee Creek	371	56	3.21
Bucatunna Creek	591	59	2.14

*Length includes 14.0 miles on Bowie River and 33 miles on Bowie Creek.

IV. PROJECT DESCRIPTION

The Corps of Engineers in their current comprehensive study of the water resources of the Pascagoula River Basin has given consideration to a number of possible dam sites. Projects have been proposed for early action for five of these. Eleven others have potential for development and will be given further consideration should future needs require it. Table 2 lists proposed early action sites with pertinent information on each. Table 3 lists the potential sites. These sites are shown on Exhibits 11, 12 and 13, Appendix VIII.

For reaches below each of the proposed early action sites, an analysis was made to determine the need for storage for water supply and water quality control. The results of these analyses have been discussed in Section VIII.

TABLE 2

SUMMARY OF PERTINENT DATA FOR CORPS OF ENGINEERS
PROPOSED ACTION PROJECTS
PASCAGOULA RIVER BASIN

	Tallahala	Taylorsville	Mize	Bowie	Harleston
Stream	Tallahala Cr.	Leaf R.	Oakohay Cr.	Bowie Cr.	Escatawpa R.
Stream mile	82.1	131.5	28	11	42
Drainage area, sq. mi.	152	422	150	293	583
Dam location, county	Jasper	Smith	Smith	Covington	George-Jackson
Purpose[1]	FC,WS,WQC,R,FW	FC,R,FW,C	FC,R,FW,C	FC,WS,R,FW	FC,WS,WQC,R,FW
Pool elevations, msl					
Conservation (normal)	302.0	278.0	316.0	236.0	85.5
Average summer	304.0	278.0	316.0	236.0	81.5
100-year flood[2]	315.6	301.3	329.0	253.0	101.5
Storage volumes, acre-feet					
Sedimentation	7,100	9,100	3,000	5,600	16,700
Conservation	35,900-55,900	28,900	37,000	74,400	258,800
Water supply	(35,900)	---	---	(74,400)	(30,300)
Water quality	(20,000-0)	---	---	---	(228,500)
Flood (100-year pool)	50,000-70,000	195,000	70,000	135,700	323,300
Total, to spillway crest	310,000	582,000	211,000	428,000	965,000
Dam dimensions and data					
Type	earthfill	earthfill	earthfill	earthfill	earthfill
Length, feet	8,000	7,500	5,200	8,600	13,700
Maximum height, feet	71.5	86.0	64.5	94.5	80.0
Areas, acres					
Avg. summer pool	4,400	3,500	3,600	5,500	14,000
Total to be acquired	15,000[3]	30,500[4]	13,600[3]	21,850	37,600

[1] FC = Flood control, WS = Water supply, WQC = Water quality control, R = Recreation, FW = Fish and wildlife, C = Conservation storage for future water use needs (WQC, WS).
[2] 48-hour rainfall
[3] Includes 600 acres for recreational lands.
[4] Includes 3,000 acres on which flowage easement rights will be obtained.

TABLE 3

POTENTIAL CORPS OF ENGINEERS PROJECTS
PASCAGOULA RIVER BASIN

Site	County[1]	Stream
Upper Escatawpa	Mobile (Alabama)	Escatawpa River
Vancleave	Jackson	Bluff Creek
Perkinston	Stone	Red Creek
Benndale	Stone	Black Creek
Leakesville	Greene	Big Creek
Bucatunna	Wayne	Bucatunna Creek
Manasse	Clarke	Bucatunna Creek
Waynesboro	Wayne	Chickasawhay River
Graham	Lauderdale	Tallahatta Creek
Moss	Jasper	Tallahoma Creek
Tallasher	Newton	Tallasher Creek

[1] In Mississippi unless otherwise noted.

V. WATER RESOURCES OF THE STUDY AREA

General

The water resources of the Pascagoula River Basin are generally abundant and the quality is fair to excellent. There are vast quantities of untapped ground water and to date surface water requirements in the basin have been met without the use of control structures. Provided proper concern is given to pollution abatement, surface and ground water resources should support all anticipated municipal and industrial growth.

Quantity of Surface Water

Streams of the Pascagoula River Basin at present are largely uncontrolled. A flood control project has been completed on Sowashee Creek near Meridian, and an impoundment on Flint Creek near Wiggins will effect some flood control on that stream. A reservoir on Big Creek, near Mobile, is used primarily for the city's water supply and during periods of drought does not release water. No low-flow control structures are operating in the basin at this time.

The U. S. Army Corps of Engineers is constructing a multipurpose dam on Okatibbee Creek above Meridian. This project will provide some 21,300 acre feet per year for water quality control downstream.

All of the counties in the basin are within organized Soil Conservation Districts and are actively engaged in carrying out soil and water conservation practices.

Important aspects of the uncontrolled hydrology of the principal streams of the basin for selected points are shown in Table 4. Exhibits 2 and 3 in Appendix VIII show the seasonal variation of average monthly flows of Bowie Creek and the Escatawpa River at Lux and Harleston, Mississippi, respectively. These places are near sites proposed for impoundments by the Corps of Engineers. The supporting data for the information in Table 4 and Exhibit 3 for Harleston are USGS flow records for Wilmer, Alabama, and Hurley, Mississippi.

Quality of Surface Water

<u>Description of Survey</u>

A field survey to determine the present water quality of the Pascagoula River and its major tributaries was made in 1965 by the Southeastern Comprehensive Water Pollution Control Project. Earlier water quality studies were made by the U. S. Public Health Service on the Leaf River below Hattiesburg in 1951 (5) and on the Chickasawhay River and Okatibbee Creek in 1963 (6). In 1961 and 1962 the

TABLE 4

UNCONTROLLED FLOW CHARACTERISTICS
PASCAGOULA RIVER BASIN

Location	Expected Annual Low Flow in cfs for 7 Consecutive Days (Base Period of Record 1929-1958)			Extreme Flows in cfs			
	Once in 5 yrs.	Once in 10 yrs.	Once in 20 yrs.	Period of Record	Minimum Momentary Flow	Maximum Momentary Flow	Minimum Daily Flow
Pascagoula River at Merrill, Miss.	962	861	774	1930 to 1965	696	178,000	704
Leaf River at Hattiesburg, Miss.	372	340	314*	1938 to 1965	318*	72,200	322
Chickasawhay River at Enterprise, Miss.	28	23	19	1938 to 1965	18	61,700	18
Escatawpa River at Harleston, Miss.‡	120	90	70	1945 to 1965	61	52,000	63
Bowie Creek near Hattiesburg, Miss.	100	91	84	1938 to 1965	83	34,800	83

* A flow of 314 cfs may be expected once in 20 years based on statistical extrapolation. The 318 cfs is an actual observation made on October 22, 1963. The 322 cfs was observed on October 23, 1963.

‡ Interpolated from records for Wilmer, Alabama, and Hurley, Mississippi.

Mississippi State Game and Fish Commission conducted a biological study of the Leaf River (7) and in 1963 and 1964 a similar study on the Pascagoula and Escatawpa Rivers (8). Water quality studies have been made by the Mississippi State Board of Health at selected sites in the basin and by the U. S. Geological Survey, Mississippi, and Alabama Divisions (2, 3, 9, 10, 11, 12).

During the SECWPC Project survey, routine samples were taken at 108 stations on the main stems of the Leaf, Chickasawhay and Pascagoula Rivers and their important tributaries. (A short description of these stations is given in Appendix VI, and they are shown on the fold-out basin maps in the back of this report, Exhibits 11, 12, 13 and 14 of Appendix VIII.)

The samples were routinely examined for dissolved oxygen (D.O.), 5-day biochemical oxygen demand (B.O.D.), pH, chlorides, total hardness, total alkalinity, conductivity, total coliform density (hereinafter referred to as coliform density) and fecal coliform density. Selected samples were examined for nitrogen and phosphorus compounds, turbidity, residue, iron, manganese and color. (A statistical tabulation of the survey data is presented in Appendix VII.)

A biological survey was conducted in 1965 to evaluate the water quality at selected stations by the populations of bottom-dwelling organisms. (The results are treated separately under "Biological Investigations" at the end of this section.)

Findings

The FWPCA survey showed that except for several reaches below or in the vicinity of population centers or industrial complexes, the streams of the basin are generally in good condition. The exceptions are the Leaf River below Hattiesburg, Tallahala Creek below Laurel, Okatibbee Creek below Meridian and the Pascagoula-Escatawpa estuary. Some of the general findings follow, arranged by principal rivers and tributaries.

1. Leaf River Sub-Basin

Leaf River Main Stem

Sampling in the summer of 1965 showed the Leaf River from the vicinity of Taylorsville to Hattiesburg to be in generally good condition except for bacterial contamination. Above Taylorsville, and above the site of a proposed early action impoundment project of the Corps of Engineers, total coliform densities of 2,400 and 490, respectively, were observed. An impoundment would be expected to improve these waters with respect to bacteria densities. From Taylorsville to Hattiesburg the total coliform densities were higher due to the effluents

from Taylorsville and Bay Springs. Directly below Taylorsville and below the Jones-Forrest county line densities were above those recommended as a limit for raw water supplies and were well above the limits generally accepted for water contact sports.

The reach from Hattiesburg to McLain (Station 274570) receives wastes from the Hattiesburg area and from Tallahala Creek, the latter having a seasonal variation. Exhibit 4 in Appendix VIII shows the average D.O. concentration observed in this reach during the summer of 1965, when flows averaged 995 cfs at Hattiesburg. No D.O. concentration below 3.1 mg/l was observed in this period. The winter survey showed higher average values for D.O. due to the higher flows even though a greater amount of waste was entering from Tallahala Creek. Despite the excellent average levels of D.O. observed, a slug of waste from Tallahala Creek in late March was observed to depress the D.O. to 3.9 mg/l at Station 274610 despite an average daily flow of 4,150 cfs on that occasion.

Chlorides rose from an average of 13 mg/l at the station immediately above Hattiesburg to an average of 144 at Hattiesburg. A maximum of 768 mg/l was observed at Hattiesburg indicating that slugs of chloride bearing wastes may be discharged at Hattiesburg or from oil and gas producers north of that city. A plant manufacturing naval stores and their derivatives discharges wastes containing phenols into the Bowie River at Hattiesburg (5). The quantities reported would result in higher concentrations in the river than can be tolerated for municipal water supplies and some industrial uses.

Although the FWPCA survey showed average conditions in the Leaf River below Hattiesburg to be not unfavorable for fish life, the biological examinations showed that at McCallum and below Tallahala Creek there were no pollution sensitive benthic organisms. This is an indication of intermittent pollution lethal to these forms. (See discussion of biological findings at end of this section.)

Oakohay Creek, Big Creek and Okatoma Creek

High coliform densities were observed on Oakohay Creek below Mize and on Big Creek below Bay Springs. The waters above Mize, at the site of a proposed early action Corps of Engineers impoundment project, would not be suspect but those below are presently unsatisfactory for water contact sports.

Big Creek appears to be subject to occasional pollution with chlorides from oil field operations but the concentrations observed during the study were not detrimental to most water uses.

The town of Magee, in the headwaters of Okatoma Creek, discharges inadequately treated domestic wastes into the stream.

Collins does not provide treatment for domestic wastes but an important industry there does. These significant waste loads were found not to seriously affect the stream during a reconnaissance survey although there was a slight D.O. sag below Collins. There are indications that a greater depression of dissolved oxygen occurs at times of low flow. The sanitary quality of the stream is poor.

Routine sampling on Okatoma Creek at Station 275260, near its junction with Bowie Creek, showed that the chemical and physical condition of the waters it contributes to Bowie River is generally good but coliform densities are higher than can be tolerated for raw water supplies or water contact sports.

Bowie Creek and Bowie River

A reconnaissance of Bowie Creek in May 1965 indicated that Station 275350 at U. S. Highway 49 was representative of the stream. This station, along with Station 275260 on the Okatoma Creek and Station 275220 on the Bowie River above Hattiesburg were routinely examined in the summer survey of the Leaf River sub-basin.

The survey showed Bowie Creek to be in good condition. The values for iron and manganese are high and could be detrimental to municipal and industrial uses.

Despite the high mean density for total coliforms, there are not significant sources of municipal or industrial pollution on Bowie Creek above Station 275350. Two stations above the site proposed for an early action Corps of Engineers impoundment project, sampled on the reconnaissance survey, showed total coliform densities of 790 and 2,250 per 100 ml. On the basis of the improvement of water quality-reservoirs, the bacterial densities observed at this station would probably not prohibit the use of these impounded waters for recreation.

Like Okatoma and Bowie Creeks, its two principal tributaries, Bowie River above Hattiesburg was in good condition with respect to chemical and physical parameters of quality. The sanitary quality, however, indicated a stream unsuitable for contact water sports or a raw-domestic water supply.

Tallahala and Tallahoma Creeks

Tallahala and Tallahoma Creeks were surveyed in the period February through March and June through August 1965. (A special report on the Tallahala Creek watershed (13) has been transmitted to the U. S. Army Corps of Engineers who propose a multipurpose impoundment on the Tallahala above Laurel.)

This survey found that the water quality of Tallahala Creek was grossly degraded in the summer from Laurel to near its junction with the Leaf River, a distance of about 54 miles. At Station 274830, below the outfalls of a large wood products manufacturer, the D. O. level was at or near zero for all samples taken in June, July, and August. Below Runnelstown, at Station 274730, the D. O. values averaged 2.9 mg/l with a minimum of 0.6 mg/l. Near the junction of the Creek with the Leaf River, at Station 274702, the average D. O. value was 5.7 mg/l with a minimum of 2.2 mg/l.

In the winter survey the condition of the reach between Laurel and the creek's mouth was better than that observed in the summer but was subject to fluctuations. On one day late in March, however, a "slug" of waste released from the wood products plant in Laurel resulted in depressing the oxygen content to 3.2 mg/l directly below Laurel, to 0.3 mg/l below Ellisville, to zero at Station 274740 and to 1.4 mg/l at the station near the mouth of the stream.

Below Laurel to the creek's mouth the coliform and fecal coliform densities were very high due to untreated municipal wastes discharged at Laurel and Ellisville.

The reach of the Tallahala from Laurel to its mouth was found to be unsuitable at present for any use other than the transport of wastes.

Above Laurel and in the vicinity of a proposed U. S. Army Corps of Engineers impoundment, the stream was in good condition. On one occasion a chloride content of 100 mg/l was observed and some traces of oil were seen at times on the surface of the stream indicating that oil field operations above Laurel sometimes discharge wastes into the creek.

Examinations for total nitrogen concentrations showed an average of 2.53 mg/l present. Phosphates averaged 0.046 mg/l. These amounts are not detrimental to the quality of the stream. Total coliform densities above Laurel on the Tallahala showed a geometric mean of 5,516 per 100 ml and for the majority of observations were above the limit recommended for water contact sports. There are no known significant sources of pollution above Laurel or this station. After impoundment in a reservoir this water should be suitable for water contact sports. These waters would be suitable for a municipal or industrial water supply after treatment.

During the survey of the Tallahala, Station 274940 on Tallahoma Creek, was sampled routinely to determine the quality of the water being discharged to the Tallahala. The site of a

possible future Corps of Engineers impoundment project is located on the Tallahoma north of Laurel.

The average D. O. observed at Station 274940 was 8.3 mg/l but supersaturation at times showed the presence of algae. Chlorides ranged from 0.0 to 160 mg/l, indicating intermittent discharges from oil field operations.

Coliform densities were high. This is attributed to the effluents from two lagoons, one treating dairy wastes, the other domestic wastes.

Tallahoma Creek at the station sampled showed a quality inferior to Tallahala Creek above Laurel. The causes, however, are known, and except for the bacterial pollution, the quality of the water is similar to that of the upper Tallahala. The waters above Laurel should be satisfactory for most uses, including domestic supplies with proper treatment.

Bogue Homo Creek, Thompson Creek and Gaines Creek

During the summer survey of the Leaf River sub-basin Stations 274683, 274590 and 274575, on Bogue Homo Creek, Thompson Creek and Gaines Creek, respectively, were sampled. These stations are near the mouths of these creeks but give representative results for the rest of the stream.

These three streams were found to be in good condition with respect to chemical and physical characteristics. Only Bogue Homo exhibited chloride concentrations higher than normal. Nitrogen and phosphorus compounds were low on all three streams.

Coliform and fecal coliforms densities were observed over a great range with geometric means for the three streams exceeding the limit generally accepted for water contact sports. Except for the reach on Thompson Creek below Richton, the bacterial densities do not entirely preclude the use of the waters for recreation in impoundments as quality will improve with storage. Richton discharges untreated sewage to Thompson Creek.

2. Chickasawhay River Sub-basin

Chickasawhay River Main Stem

A survey of the Chickasawhay River main stem from Enterprise to Waynesboro was made by the U. S. Public Health Service in November and December 1963 as part of a study in connection with the U. S. Army Corps of Engineers impoundment on Okatibbee Creek. A report of this study (6) has been rendered to the Corps of Engineers. In the period June through September 1965

a survey of the main stem was made by the FWPCA using two stations of the earlier study and five others below Waynesboro to the Pascagoula River.

Data from the two surveys show the Enterprise-Waynesboro reach to be affected by pollution from the Meridian area and from oil field operations. The organic pollution from Meridian appears to be variable and at times to cause undesirable effects as far downstream as Quitman. Waste brines from oil fields in the Eucutta and Yellow Creek areas sometimes cause chloride concentrations in the main stem which would be undesirable for some water uses.

The sanitary condition of this reach was poor. The coliform densities showed means above the generally recommended limits for contact water sports. For municipal supplies, these waters would be considered a poor source as they would require a high degree of treatment plus disinfection.

There is a potential U. S. Army Corps of Engineers impoundment site above Waynesboro in this reach of the Chickasawhay River (see location map).

The reach between Waynesboro and the river's mouth is in good condition with respect to D. O. and the B.O.D. Chloride content is high and objectionable concentrations are reached at times. The above mentioned oil field operations above Waynesboro appear to cause this pollution which also may be the cause of hardness above normal for streams of this area. The sanitary quality of the waters of this reach would prohibit contact water sports but would not preclude the use of the stream for municipal and industrial water supplies if the chloride content can be controlled.

Chunky River, Tallahatta Creek and Tallasher Creek

In early June 1965 a reconnaissance was made of the Chunky River and its more important tributaries. The findings at 11 stations indicated that the waters of Potterchitto and Oakahatta Creeks, the Chunky River above Oakahatta Creek, Tallasher Creek and Tallahatta Creek were in good condition. On the basis of this, three stations were chosen for routine sampling in the June through September survey of the Chickasawhay River sub-basin.

The Chunky River appears to be in relatively good condition. The mean coliform counts are above the limits generally recommended for contact water sports but are acceptable for a water supply if proper treatment and disinfection are provided. Newton, Decatur and Union are sources of human pollution in this watershed.

Tallahatta Creek exhibited a condition similar to that of the Chunky. Coliform densities observed were higher than the limit usually accepted for water contact sports. These densities should not preclude the use of these waters for fishing and will not affect their use for raw water supplies.

Tallasher Creek, on which there is a potential Corps of Engineers impoundment project site, was not routinely sampled but the reconnaissance survey showed it to be in comparatively good condition. Again, coliform densities were high in the absence of known sources of human pollution as on Tallahatta Creek.

Okatibbee Creek

In the previously referred to study of Okatibbee Creek by the U. S. Public Health Service, in November and December of 1963 (6), 13 stations on this stream were examined. Of these, one (Station 274305) was routinely examined during the 1965 survey of the Pascagoula River Basin. This station is about four miles upstream from the mouth of Okatibbee Creek.

The earlier study showed that from its headwaters to the mouth of Sowashee Creek, Okatibbee Creek is in good condition with respect to chemical and physical parameters. At a station just below Sowashee Creek, the condition of Okatibbee Creek showed the impact of wastes from that tributary.

In the summer survey of 1965, the average D. O. concentration at Station 274305 was 1.9 mg/l. For ten samples taken between September 20 and October 1, when flows at this station averaged 55 cfs, the average D. O. concentration was 1.2 mg/l and a level of 0.0 mg/l was reached on three occasions. The coliform and fecal coliform densities were quite high with a geometric mean 151,740 per 100 ml for the former.

Souinlovey Creek

In June and September of 1965, Station 274170 on Souinlovey Creek was sampled to determine the quality of the water being contributed to the Chickasawhay. The stream was found to be in good condition.

Bucatunna Creek

Seven stations on Bucatunna Creek were sampled on a reconnaissance survey made in early June of 1965. As these showed the stream to be in good condition and the findings at Station 274010 were representative, this station was selected for routine sampling. Station 274010 is located at U. S. Highway 84.

The waters of Bucatunna Creek were found to be in good condition and suitable for a source of municipal and industrial water supplies.

Observations for chloride content showed a range indicating possible pollution from oil field operations.

Coliform counts were higher than the limits generally given for contact water sports, but were lower than for most streams of the area. Since the watershed is sparsely settled, additional studies are needed to determine the source of these coliform groups.

There are two sites on the Bucatunna Creek which are being considered for possible future Corps of Engineers impoundment projects, one east of Quitman and another east of Waynesboro.

Big Creek (Wayne County) and Big Creek (Greene County)

Stations 273985 and 273920, on Big Creek (Wayne County) and Big Creek (Greene County) were sampled routinely during June and September of 1965. These stations are representative of the streams.

The waters of these two creeks were found to be in good condition and suitable for municipal water supplies with treatment and for industrial water supplies. The coliform densities were found to be above the limit generally recommended for contact water sports, although they were lower than those observed for many streams in the area. Both creeks drain sparsely populated areas and the observed coliform densities indicate a need for more study to determine their source and health significance. There is a site on the watershed of Big Creek(Greene County) which offers the possibility of a future Corps of Engineers impoundment project.

3. Lower Pascagoula Sub-basin

Pascagoula River Main Stem, Merrill to Cumbest Bluff

The Pascagoula River flows for about 65 miles from the point of its formation at the confluence of the Leaf and Chickasawhay Rivers to where it divides into the Pascagoula River and the West Pascagoula River. For about 63 miles of this reach or to a point about 6 miles downstream of Cumbest Bluff, there is no effect by salt water from Mississippi Sound.

Samples were taken in March and April and again in July of 1965 six points in this reach, from Station 273895 at Merrill to Station 273745 at Cumbest Bluff. Flows at Merrill during the survey ranged from 13,200 cfs in the spring months to 1,950 cfs in the summer.

The chemical and physical parameters of water quality observed in this survey, with the exception of chlorides, showed the Pascagoula River between Merrill and Cumbest Bluff to be in good condition.

Observations for chlorides show that at times these are present in concentrations which are above acceptable limits for municipal and industrial water supplies. A "slug" of chlorides causing a concentration of 2,880 mg/l was observed on one day at Station 273880. On another day, a concentration of 575 mg/l was observed. The average value for chloride concentrations at this point without these high values was 84 mg/l for sixteen samples. The larger "slug" was observed to cause high values down to Cumbest Bluff (Station 273745) where a concentration of 345 mg/l was recorded. At other times, the chlorides content was low, observed minimums ranging from 57 mg/l at Station 273895 to 2 mg/l at Station 273850. B.O.D. concentrations observed on the day the "slug" was discovered were normal. It appears that the chlorides originated in the Leaf or the Chickasawhay watershed, probably from oil field operations.

The sanitary quality of the waters indicated that they could be used for municipal water supplies if properly treated. Coliform densities were, however, above that ordinarily recommended as a limit for contact water sports.

The Mississippi State Game and Fish Commission has reported trouble with filamentous growths entering the Pascagoula from the Leaf River. This is referred to in the discussion of biological investigations at the end of this section.

Black Creek

Six stations on Black Creek between Mississippi State Highway 589 (Station 273843) northwest of Purvis and State Highway 57 (Station 273800) near Benndale were sampled in May of 1965.

Black Creek was found to be in relatively good condition with respect to chemical and physical parameters of water quality. Coliform densities showed a geometric mean over 2,000 per 100 ml at only one point, Station 273840. This station also showed the highest values for chlorides, hardness and alkalinity but none of these were excessive. It appears that these higher values are due to wastes of an oil refinery near Purvis.

The information furnished by the oil refinery for the inventory of waste discharges made during the survey indicates that the plant, at times, releases phenols. The amounts reported would be deleterious to the use of these waters as a source of municipal water supplies. At low flows the concentrations would be sufficient to be damaging to fish.

The waters of Black Creek are suitable for industrial and municipal water supplies with the exception of the phenol content. The sanitary quality of the waters was suitable for recreation, including water contact sports, except possibly in the reach near Purvis.

There is a possible future site for a Corps of Engineers impoundment on Black Creek above State Highway 26.

Red Creek

Six stations on Red Creek between Interstate Highway 59 (Station 273785) and a point near Vestry (Station 273760) were sampled in May of 1965.

The creek was found to be in good condition. Despite the large amount of wastes entering Flint Creek from a pickle manufacturing plant, Red Creek shows high D.O. levels. The coliform levels, although higher than generally recommended as a limit for water contact sports, were low when compared with those found in other streams in southern Mississippi. These waters would be suitable for most uses, including raw-municipal water supplies.

There is a potential site for a Corps of Engineers reservoir on Red Creek near Perkinston.

Bluff Creek

In May 1965 two stations on Bluff Creek, one above the potential Corps of Engineers impoundment site and one below, were sampled. The average observed D. O. at the upper station was 6.4 mg/l and at the lower station 7.4 mg/l. Total coliform densities at the upper station had a geometric mean of 756 per 100 ml. At the lower station the densities were higher with a geometric mean of 4,960 per 100 ml for total coliforms. Chlorides, hardness, pH and alkalinity were low. These waters are of a quality satisfactory for municipal and industrial water supply. Above the potential dam site the sanitary quality of the water is satisfactory for water contact sports.

Escatawpa River above Orange Grove

Between late March and early October of 1965, five stations were sampled from the vicinity of Goodes Mill Lake (Station 273635) to Wilmer, Alabama, (Station 010050). The two lower stations of this group (273635 and 273640) are at mile 12.70 and mile 14.5 from the mouth of the river and are within the zone of influence by tide and salt-water from Mississippi Sound. The other three stations are above the zone influenced

by salt-water. All are above the influence of sources of pollution in the Pascagoula-Moss Point area.

The three stations above the limit of salt-water intrusion showed evidence of intermittent pollution from the oil fields in the Citronelle area. Observations made by the U. S. Geological Survey indicate that salt brines may be reaching the Escatawpa system by percolation from brine pits (10).

Examinations for nutrients were made at Stations 010050, 273665, and 273635. The total nitrogen content was low, as was that of total phosphates.

The U. S. Geological Survey has reported iron concentrations between 0.00 and 0.17 mg/l at Hurley (Station 273665). Manganese was reported in concentrations between 0.00 and 0.08 mg/l (3).

Color observations made by the U. S. Geological Survey at Hurley show a range of 5 to 70 units (7). These levels, although high, will not interfere with the use of these waters for a raw municipal supply or for most industrial applications.

Station 010050 at Wilmer showed a geometric mean of 8,894 per 100 ml for coliform densities with geometric mean for fecal coliform of 442. As indicated by geometric means, the densities fell off downstream. Individual observations showed high counts to be prevalent throughout this reach with maximums being reached at times of high flow. A source of bacteria appears to be the town of Citronelle, Alabama, which is now planning to install a sewage treatment facility.

The chemical parameters of quality, with the exception of chlorides, show the Escatawpa above Orange Grove to be in good condition. High chloride concentrations, which appear to be caused by oilfield operations and appear in the river as "slugs", reach levels which are objectionable. Present high coliform densities make the river unsuitable for contact water sports part of the time.

The Pascagoula-Escatawpa Estuary

In April and in the period June to late October 1965, thirteen stations in the lower Pascagoula-Escatawpa estuary were sampled routinely. This area is shown on the fold-out map, Exhibit 14, in the back of this report. On the Escatawpa, the reach from Orange Grove (Station 273630) to the junction with the Pascagoula was examined. The Pascagoula River was sampled from Brickyard Bayou (Station 273710) to its mouth. Two stations on the West Pascagoula were included in the survey, one at Singing River Camp (Station 273440) and another at U. S. Highway 90 (Station 273420).

The West Pascagoula at Station 273440 showed waters of a quality similar to those of the upper Pascagoula. D. O. values averaged 6.3 mg/l, and the average value for B.O.D. was 2.1 mg/l. Coliform densities were below those observed at Cumbest Bluff (Station 273745).

On the same day that an abnormal level for B.O.D. was observed at all stations between U. S. Highway 26 and Cumbest Bluff on the upper Pascagoula, an abnormal level was observed at Singing River Camp. This indicates that at a time of high flow a waste which apparently originated on Tallahala Creek still persisted as far down as the estuary.

At U. S. Highway 90 (Station 273420), the D. O. levels ranged from 4.0 to 8.6 mg/l during the study with an average of 6.2. The low value occurred in April at a time when similar values were being observed in the Pascagoula at U. S. Highway 90. B.O.D. levels at this station averaged 2.0 mg/l.

Coliform densities at this station were high for most observations having a range of 330 to 240,000 per 100 ml. The geometric mean was 10,532 per 100 ml.

Apparently the occasional low D. O. levels and the high bacterial densities in the lower West Pascagoula River are caused by the water entering the estuary with the tide from Pascagoula Bay or by way of channels and bayous connecting it to the Pascagoula River to the east.

Station 273710, on the Pascagoula River near Brickyard Bayou, showed that although it was above sources of pollution in the estuary, the tidal action carried wastes at least up to that point. The D. O. levels during the survey ranged from 0.0 to 8.0 mg/l with an average of 5.0 mg/l. B.O.D. values ranged from 0.3 to 15.0 mg/l. Coliform densities were observed from 80 per 100 ml to 160,000 per 100 ml. Fecal coliforms showed a variation of from zero to 130,000 per 100 ml.

The concentration of wastes is along the Escatawpa from about mile 1.5 above its mouth to about mile 4.8. The tidal action, however, causes wastes to be driven upstream at least as far as Station 273630 at Orange Grove (See Exhibit 13).

In the period of the survey, April to October, the Escatawpa showed a progressively worsening condition from Orange Grove on downstream. At Station 273625, the average D. O. concentration was 4.9 mg/l with a low of 1.8 mg/l. At Station 273620, just above the large paper mill at Moss Point, the average of the D. O. values observed was 3.3 mg/l with zero values occurring. Below the paper mill, the fish reduction plants and a synthetic

rubber plant, at Station 273610, twenty-two of twenty-eight observations showed zero D. O. concentrations and the average was 0.4 mg/l. B.O.D. values averaged 31 mg/l with a maximum of 150 mg/l. Observations taken at Station 273605 (State Highway 63) showed zero levels for D. O. for seventeen out of fifty-one observations, with an average of 1.8 mg/l. Floating sludge masses were often observed during this period.

Coliform densities in the reach between Stations 273625 and 273605 were very high. Although there is one municipal sewage treatment plant discharging wastes into the Escatawpa estuary and another whose effluent may be brought in by the tide, the levels of bacteria were above those which would be expected from the domestic wastes of the population of Escatawpa and Moss Point after treatment.

Just below the mouth of the Escatawpa, two stations, one on the right side and one on the left of the Pascagoula River, were established. Despite the added flow, these stations showed averages of 2.3 and 3.1 mg/l of D. O. with occurrences of zero D. O. At the next station downstream, Station 273580, the D. O. average was 2.9 mg/l and zero concentrations still occurred. From this point on to the mouth of the river, where the average D. O. was 5.1 mg/l, the quality of the water improved. High coliform densities persisted to the mouth of the Pascagoula River.

The Pascagoula-Escatawpa estuary in the winter months, before the fish reduction plants start operations and while flows are high and temperatures are low, presents a different picture than it does in the summer months. Exhibit 5, Appendix VIII, shows the two conditions. These curves were prepared from data obtained from the survey being reported and a body of data covering three years furnished by the Mississippi State Game and Fish Commission.

Pascagoula Bay

A limited survey of Pascagoula Bay was made during February and October of 1965 to measure the sanitary quality of its waters during periods of high and low river flow.

Since February 1961 the oyster reefs offshore of the estuary have been closed due to the sanitary condition of the water. An outbreak of infectious hepatitis in the Pascagoula area between late December 1960 and March 1961 was found to have resulted from the eating of raw oysters taken from these reefs (14).

During conditions of wet weather and high river flow, the bacterial content of the bay waters rises due to land runoff and the bypassing of raw waste in overloaded municipal waste treatment plants in the area. At the time of the February survey, the average flow of the Pascagoula River at Merrill was 24,500 cfs.

The February survey disclosed that coliform densities at all stations over the present and potential oyster growing areas were above the limit set by the Public Health Service for approval of a harvesting area from which the oysters may be shipped in interstate commerce (15). The bay stations and the median coliform densities observed are shown on a map, Exhibit 6, Appendix VIII.

The median coliform densities decreased with distance from the mouths of the Pascagoula and West Pascagoula Rivers. The bacterial densities were extremely high in the Pascagoula River at U. S. Highway 90 (Station 273570), but were somewhat lower on the West Pascagoula River at U. S. Highway 90 (Station 273420).

The fecal coliform densities, indicators of pollution from warm-blooded animals, were much lower than total coliform densities; however, they alone were above limits set for median total coliform densities in the shellfish areas.

Selected stations were sampled during the October period to determine change of water quality from the February conditions. The average flow at Merrill during the October survey was 1,534 cfs, a marked decrease from the 24,500 cfs February flow. The salinities were higher at these stations during the summer period due to less dilution of sea water by fresh water. The bacterial content was much lower during the October survey but was still above limits for shellfish harvesting at Stations 273301 through 273308 in the present and potential growing areas which are closed for this purpose. Median coliform densities at stations approximately two miles from shore and west of the Pascagoula navigation channel were within limits classed as "restricted" (15), except at Station 273312. This station is affected by the Pascagoula River, whose flow normally travels in a southeasterly direction from the mouth. The median coliform densities were within acceptable levels for approved areas for shellfish harvesting during October 1965 at Stations 273320, 273321, and 273322 located approximately two miles from shore in the Bayou Casotte area.

4. Biological Investigations

General

Biological assessment of water quality was made by analysis of populations of bottom-dwelling invertebrates sampled quarterly during 1965 at 12 sites in the basin. Locations of these benthic sampling stations are given in Table 5, and they are shown on the Location Maps in the back of this report.

TABLE 5

BENTHIC SAMPLING STATIONS - PASCAGOULA RIVER BASIN
1965

Station	County	Location
1	Smith	Leaf River - approximately ½ mile upstream from FWPCA Station 275710 at U. S. Highway 84.
2	Jones	Leaf River - ½ mile downstream from Eastabutchie crossing north of Hattiesburg at FWPCA Station 275460.
3	Forrest	Bowie Creek - north of Hattiesburg, ½ mile upstream from U. S. Highway 49 at FWPCA Station 275350.
4.	Forrest	Leaf River - south of Hattiesburg, 100 yards upstream from FWPCA Station 275050 at old McCallum bridge.
5.	Jones	Tallahala Creek - north of Laurel, 150 yards downstream from FWPCA Station 274890 at Sandersville crossing.
6	Jones	Tallahala Creek - south of Ellisville, 50 yards upstream from FWPCA Station 274750.
7	Perry	Leaf River - approximately 1 mile below the mouth of Tallahala Creek.
8	Lauderdale	Okatibbee Creek - north of Meridian, 100 yards downstream from gravel road crossing, Section 28, R 15 E, T 7 N.
9	Lauderdale	Okatibbee Creek - south of Meridian, 100 yards downstream from first gravel road crossing below the mouth of Sowashee Creek.
10	Clarke	Chickasawhay River - downstream from Quitman municipal outfall.
11	Wayne	Chickasawhay River - south of Waynesboro, ¼ mile downstream from FWPCA Station 274120 at U. S. Highway 63.
12	Jackson	Pascagoula River - approximately ½ mile upstream from FWPCA Station 273745 at Cumbest Bluff.

Samples were collected with a Petersen dredge. Macrobenthic organisms from each collection were preserved for identification and enumeration in the laboratory.

Results of the analyses of the benthic samples are summarized in Table 6. Mean number of organisms was derived from counts of individuals collected at each station in the four series of samples. Total number of species represents all the different kinds of organisms collected in the sampling series. Number of pollution-sensitive species are all the various larvae of mayflies, caddisflies, stoneflies, and the various unionid clams included in the total number of species collected during the sampling series. Absence of sensitive species, reduction of number of species, and disproportionate abundance of organisms due to increase of tolerant species are indicative of polluted stations.

TABLE 6

SUMMARY OF BENTHIC SAMPLING RESULTS
PASCAGOULA RIVER BASIN

Station		Number of Pollution-sensitive Species	Total Number of Species	Mean Number of Organisms per Sq. Foot
1.	Leaf R.	5	22	55
2.	Leaf R.	8	27	52
3.	Bowie Cr.	4	30	137
4.	Leaf R.	0	18	957
5.	Tallahala Cr.	10	41	249
6.	Tallahala Cr.	0	9	3,764
7.	Leaf R.	0	13	226
8.	Okatibbee Cr.	12	43	513
9.	Okatibbee Cr.	0	2	31
10.	Chickasawhay R.	13	46	951
11.	Chickasawhay R.	2	22	140
12.	Pascagoula R.	10	27	296

Results of this study lead to the following conclusions for the areas indicated:

<u>Leaf River Sub-basin (Station 1-7)</u>

The two upper stations on the Leaf main stem are in satisfactory condition; the two lower stations (4 and 7) are polluted. The marked increase in the mean number of organisms at the two lower stations is due to dense populations of sludgeworms (Tubificidae), which thrive in the organic loads deposited on the bottom at these stations. Detrimental effects on the benthic fauna at Station 4 are caused by wastes from the Hattiesburg area. Part of the damage at Station 7, located downstream from the mouth

of the Tallahala Creek, can be attributed to the waste load the tributary delivers from the Laurel area. The findings corroborate those of the survey made for physical, chemical and biochemical parameters of water quality.

Water quality at Station 3, located on Bowie Creek well above major sources of waste in the area, is satisfactory. On the Tallahala Creek, Station 5, located upstream from Laurel, shows no indications of pollutional damage. In contrast, results of excessive pollution at Station 6 downstream, are clearly evident. Not only were species sensitive to pollution absent from the benthic fauna, but the number of species present were greatly reduced. The occurrence of large aggregations of sludgeworms in the samples accounts for the fifteen-fold increase in the mean number of organisms (3,764 per square foot). Findings here support those of the survey of other parameters of water quality.

Chickasawhay River Sub-basin (Stations 8-11)

Stations 8 and 9 were located on Okatibbee Creek, which receives industrial and municipal effluents from the Meridian area by way of Sowashee Creek.

Water quality at Station 8, located a considerable distance upstream from the entrance of Sowashee Creek, was found to be good. The wide variety of species, including a number sensitive to pollution, which were collected at this station, are characteristic of nonpolluted situations. At Station 9, below the mouth of Sowashee Creek, however, the benthic community has been seriously damaged by pollutants from the Meridian area. No macroscopic organisms were found in the collections made during June and September. At this time, the entire stream bottom was covered with a black material smelling like creosote. In the other two collections, a single midge larva was taken, and the fauna was composed only of small aggregations of sludgeworms. The condition of Okatibbee Creek in this area as indicated by physical, chemical and biochemical parameters agrees with these findings.

On the Chickasawhay River at Station 10, located below the Quitman outfall, the occurrence of a diversity of species, including several species sensitive to pollution, indicates that the water quality is good. Recovery from the waste loads discharged into the main stream by the Okatibbee Creek has apparently occurred in the stretch of the river above this station. At Station 11, there is evidence of mild pollution. Only two pollution-sensitive species were found there, and they were present only in the June collection. This station is subjected to municipal effluents from the Waynesboro area and to occasional slugs of salt water from the upstream oil fields.

Lower Pascagoula Sub-basin

During the present study, sampling on the main stream of the Pascagoula River was limited to Station 12, located in the lower reach near Cumbest Bluff. The well-balanced community of bottom-dwelling fauna existing there indicated the absence of damage from pollution.

Findings from the pollution study of the Pascagoula River, conducted by the Mississippi Game and Fish Commission during 1963-1964 (6), show that the upper 60 miles of the river is relatively unpolluted and that it supports a variety of desirable aquatic life. Diverse populations of benthic organisms important in the food-chain of fishes were found at upstream Stations I, II and V (see Exhibit 13 in back of report).* At two stations, VI and XIII (see Exhibit 14), pollutional effects from the Escatawpa River discharge had damaged the bottom communities. These stations are located below the unpolluted Station 12 of the 1965 study.

Regarding effects of pollution on the fisheries of the river, the report states (pp. 29-30):

> In prior years massive fish kills have occurred in the upper region of the Pascagoula as a result of the deoxygenating effects of effluents from Masonite Corporation, in Laurel, Mississippi (Game and Fish records). Due to the installation of new waste disposal techniques and correlating waste water discharge with high flows, these massive kills have been avoided in recent years. This has only been possible, however, by constant stream surveillance by the Technical Service Staff of Masonite.
>
> One thing that still causes considerable concern to commercial fishermen on the upper Pascagoula during the spring and early summer months is filaments of *Sphaerotilus*. These white filamentous growths break loose below the grossly polluted zones in the Leaf River and Tallahala Creek and float into the Pascagoula and become entangled on fishing nets. The occurrence of large growths of *Sphaerotilus* is a result of pollution, but is certainly secondary. These growths occur below municipal as well as industrial outfalls in the Leaf River and Tallahala Creek.

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*Stations I, II, V, VI and XIII, identified in this report and on the location maps by Roman numerals to avoid confusion, are designated by Arabic numerals 1, 2, 5, 6 and 13 in the Mississippi State Game and Fish Commission Report of 1963-64.

The 1963-1964 investigation established that the lower section of the East Pascagoula and the Escatawpa are grossly polluted. The organic load from the industrial complex near Moss Point has made the lower region of the Escatawpa River unfit for aquatic life. Benthic invertebrates are completely missing, and fish are able to inhabit the area only part of the winter and early spring months. Fish kills were observed in the Escatawpa area during September 1963 and June 1964. These two kills were attributed to the deoxygenated condition of the waters in which the fish were trapped.

The biological findings for the lower East Pascagoula and Escatawpa are in agreement with those of the survey covering the chemical, biochemical and physical parameters of water quality.

Quantity of Ground Water *

The ground-water resources underlying the Pascagoula River Basin are abundant and they are the source of most water supplies in the watershed. Intensive development of these resources, however, exists at present only at Hattiesburg, Laurel, Meridian and Pascagoula. While wells yielding in excess of 2,000 gpm and supplies as large as 25 mgd in a square mile are feasible, the entire basin was using only approximately 60 mgd in 1965.

It is probable that nowhere in the basin has pumpage reached the point that no further development can be wisely taken in the general vicinity. Quality, however, may be a problem as at Pascagoula or surface water may be less expensive as at Hattiesburg for a large industrial supply. Appendix III gives the availability of ground-water at key locations in the basin.

The fresh-water-bearing section is composed chiefly of sand and clay of the Eocene or the Recent series. The major stratigraphic units are the Wilcox, Claiborne, Jackson and the Vicksburg groups. The Claiborne group of the Eocene series provides water for all purposes in the northern third of the basin. The Wilcox group is potentially important but is virtually untapped. The main source of supplies in the southern half of the basin is the Miocene group with the exception of the Pascagoula area which uses the Pliocene aquifers.

The fresh-water-bearing section is 300 to 3,500 feet thick. Ground-water levels in the basin are, however, within 50 feet of the surface in most places and, consequently, most of the wells are shallow, generally less than 300 feet deep. On the coast and in valleys there

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*This section is an abbreviated version of the U. S. Geological Survey account which is included in Appendix K.

are many flowing wells. The great depth of many aquifers has probably prevented development of supplies from them, but they represent a resource for the future.

Quality of Ground Water

Random testing conducted throughout the basin by USGS reveals a good to excellent quality ground water. Because there are numerous water bearing aquifers in the basin there are necessarily a number of variations in quality. Generally, however, the water is described as a sodium bicarbonate type, usually soft and low to moderate in most chemical qualities considered detrimental to domestic and most industrial uses.

Chemically, the water at shallow depths is slightly acid and usually a little higher in iron content count than at deeper depths. Dissolved solids are moderately low, about 100 to 250 ppm, in all counties except Jackson, here the range is about 300 to 1,000 ppm. Generally in Jackson County the water is higher in sodium, bicarbonates, and chlorides, but lower in sulphate content. Fluorides in concentrations above those recommended for drinking water supplies have been observed, especially in Jackson County. There are in these areas other aquifers which can be tapped to avoid the use of these supplies.

Salt water encroachment has become noticeable in a few places along the Gulf Coast. The Pascagoula Formation now yields water of marginal quality to some wells in Pascagoula. Some of these waters exceed 100 ppm of chlorides but the rate of encroachment has been slow.

VI. THE ECONOMY

Introduction

The purpose of the economic section of this report is to set forth demographic and economic information and data obtained from various sources to serve as the basis from which domestic and industrial water needs may be estimated for a given area, both now and in the future. The demand for water for both domestic and industrial purposes depends upon the area's demographic and economic base in an interdependent and inseparable manner, as does the amount and character of wastes produced.

Projections of major demographic and economic parameters have been made for the Pascagoula River Basin by three basin sub-areas for 1965, 1980, and the year 2015 by Michael Baker, Jr., Inc., under contract with the Corps of Engineers, Mobile District, in a report titled "Economic Base Study of the Pascagoula, Pearl, and Big Black River Basins Study Area" (16). Selections of specific data useful for the purpose of this report have been made from this Economic Base Study and reproduced in the following pages with an appropriate reference.

General

The Pascagoula River Basin economy is comparatively heterogeneous in many important respects, with population and industrial growth rates varying quite widely between the Coastal Sub-area and the two inland sub-areas into which the basin has been subdivided for study purposes.

The present and projected populations for the entire basin as defined in this section are given in Table 7. It is to be noted that Harrison County, which is not physically in the drainage basin, is included because of its being part of the economic complex. The economic growth of the basin is indicated in Table 8.

Because of the large differences in growth rates between the various areas of the basin, the estimates are presented in tables for basin sub-areas.

The rate of growth for each of the major demographic and economic parameters indicated for the Leaf Sub-area, the Chickasawhay Sub-area and the Coastal Sub-area is given in Tables 9, 10 and 11, respectively.

As may be readily noted from study of the preceding tables, the rates of growth are projected to be considerably higher for the Coastal Sub-area than for any others for each major parameter presented and for each period projected with the only exception occurring in the per capita income parameter for the 1960 to 1980 period when the rate of growth in the Leaf Sub-area exceeded that in the Coastal Sub-area by a small amount. In addition to the rates of growth being greater,

TABLE 7

PRESENT AND PROJECTED POPULATION BY SUB-AREA
PASCAGOULA RIVER BASIN

Year	Leaf River	Chickasawhay River	Pascagoula River[1]	Total[1]
		Rural Farm Population		
1965	26,800	15,600	5,400	47,800
1980	16,700	9,800	4,100	30,600
2015	12,500	7,200	3,300	23,000
		Urban and Rural-Nonfarm Population		
1965	154,500	113,200	221,200	488,900
1980	186,700	128,700	328,100	643,500
2015	333,300	204,000	729,900	1,257,200
		Total Number of Inhabitants		
1965	181,300	128,800	226,600	536,700
1980	203,400	138,500	332,200	674,100
2015	345,800	211,200	733,200	1,290,200

[1] These populations include Harrison County which is not physically in the basin but is in the economic complex. The total 1965 population within the drainage basin proper is approximately 397,900 of which about 46,900 is rural.

TABLE 8

SUMMARY OF PROJECTIONS OF MAJOR ECONOMIC INDICATORS
FOR THE PASCAGOULA RIVER DRAINAGE BASIN (16)

	1960	1965	1980	2015	Increase (in percent) 1960-80	Increase (in percent) 1980-2015
Population (thousands)	500.4	536.7	674.1	1,290.2	34.7	91.4
Number of households (thousands)	133.5	146.7	192.5	391.0	44.2	103.1
Labor force (thousands)	177.1	191.5	241.9	471.6	36.6	95.0
Employment (thousands)	149.1	160.6	203.3	405.8	36.4	99.6
Personal income (millions, 1962 dollars)	680.6	848.8	1,512.6	5,372.4	121.0	257.2
Per capita income (1962 dollars)	1,360	1,582	2,244	4,164	64.0	86.6

TABLE 9

SUMMARY OF PROJECTIONS OF MAJOR ECONOMIC INDICATORS FOR THE LEAF SUB-AREA OF THE PASCAGOULA RIVER DRAINAGE BASIN (16)

	1960	1965	1980	2015	Increase (in percent) 1960-80	Increase (in percent) 1980-2015
Population (thousands)	179.5	181.3	203.4	345.8	13.3	70.0
Number of households (thousands)	48.0	49.8	59.1	104.8	23.1	77.3
Labor force (thousands)	60.2	61.6	70.4	121.0	16.9	71.9
Employment (thousands)	55.5	56.7	65.6	114.5	18.2	74.5
Personal income (millions, 1962 dollars)	247.0	290.8	462.4	1,435.4	87.2	210.4
Per capita income (1962 dollars)	1,376	1,604	2,281	4,151	65.2	82.6

TABLE 10

SUMMARY OF PROJECTIONS OF MAJOR ECONOMIC INDICATORS FOR THE CHICKASAWHAY SUB-AREA OF THE PASCAGOULA RIVER DRAINAGE BASIN (16)

	1960	1965	1980	2015	Increase (in percent) 1960-80	Increase (in percent) 1980-2015
Population (thousands)	127.8	128.8	138.5	211.2	8.4	52.5
Number of households (thousands)	35.2	36.6	40.7	64.0	15.6	57.2
Labor force (thousands)	44.1	44.4	48.5	70.2	10.0	44.7
Employment (thousands)	40.4	40.4	44.7	66.7	10.6	49.2
Personal income (millions, 1962 dollars)	164.6	185.7	280.2	784.1	70.2	179.8
Per capita income (1962 dollars)	1,288	1,442	2,029	3,713	57.1	83.5

TABLE 11

SUMMARY OF PROJECTIONS OF MAJOR ECONOMIC INDICATORS FOR THE COASTAL SUB-AREA OF THE PASCAGOULA RIVER DRAINAGE BASIN (16)

					Increase (in percent)	
	1960	1965	1980	2015	1960-80	1980-2015
Population (thousands)	193.1	226.6	332.2	733.2	72.0	120.7
Number of households (thousands)	50.3	60.3	92.7	222.2	84.3	139.7
Labor force (thousands)	72.8	85.5	123.0	280.4	69.0	128.0
Employment (thousands)	53.2	63.5	93.0	224.6	74.8	141.5
Personal income (millions, 1962 dollars)	269.0	372.3	761.3	3,152.9	183.0	314.1
Per capita income (1962 dollars)	1,393	1,643	2,311	4,300	64.5	87.6

the 1960 base to which the growth rates are related is larger for the Coastal Sub-area than for any other except in the case of employment.

The basin and sub-area delineations used in the Economic Base Report (16) are whole-county definitions of segments of the drainage areas involved. Consequently, they can only be used to approximate economic areas in a very rough, and sometimes, not too meaningful manner for the purpose of identifying domestic and industrial needs for and use of water in a smaller area. These basin sub-areas are used, however, as the most meaningful geographic areas available for the purpose of providing a working basis for estimating water needs in specified areas. A discussion of each basin sub-area follows.

Leaf Sub-area

For purposes of this report, the Leaf Sub-area is comprised of seven Mississippi counties, i.e., Covington, Forrest, Jasper, Jones, Lamar, Perry, and Smith. There were no urban centers (places having a population of 2,500 or more) within the portions of these seven counties located outside the drainage area of the Leaf River in 1960. Two smaller centers, Purvis and Lumberton, in Lamar County, are located in the Black Creek and Red Creek drainage area. These centers, however, had a combined population of only 3,255 in 1930 and 3,722 in 1960. Except for these small centers, the population density in the county areas outside the Leaf River drainage area is, comparatively, very low. There were no major water using manufacturing industries of any appreciable size reported in Lumberton in 1964 and only one (an oil refining company reporting employment of 150) in Purvis (17). Total manufacturing employment was reported to have declined in both centers between 1958 and 1964.

The population of the Leaf Sub-area (the equivalent of the urban and rural-nonfarm combined) expected to use group facilities for water supply and waste disposal in the future is 186,700 for 1980 and 333,300 in 2015.

The two major growth centers in this sub-area are Hattiesburg in Forrest County and Laurel in Jones County. However, to ignore the satellite communities which are interdependent with these two major centers in terms of both population and economic growth is to ignore a considerable portion of the water supply and pollution control problems within the areas of influence of the two growth centers. An analysis and projection of these areas for the Leaf River Sub-area is presented in the report titled "Municipal and Industrial Water Supply and Water Quality Control Study — Tallahala Creek Watershed, Jones County, Mississippi" (13), prepared for the U. S. Army Corps of Engineers, Mobile District, by the U. S. Department of Health, Education, and Welfare, Public Health Service in December 1965, pp 20-26 and Appendix 4, tables A, B, C, D, and E.

In addition to the information provided in the previously cited report, there is a possibility that a Kraft process paper mill having an initial capacity of 600 tons per day and anticipated to expand to 1,200 tons may be established at a Forrest County (Hattiesburg SMSA) site near McCallum, Mississippi. The population of McCallum has not been reported by any census release thus far. However, it is located in Beat 4 of Forrest County which had a total population of 1,559 in 1930; 1,964 in 1940; 2,215 in 1950; and 1,812 in 1960 (nearly an eight percent loss during the most recent decade, but an overall net growth of over 16 percent during the past 30 years. A much more rapid growth as a part of the Hattiesburg SMSA is expected in the next 50 years). Since a modernized version of this type of paper mill currently requires about one employee for each two tons of equivalent production per day, direct initial employment is estimated as approximately 300 rising to a maximum of 600. This employment rate can normally be expected to add approximately 1,000 new residents to the community initially (under the near full employment conditions which were assumed to exist) and approximately 2,000 when maximum employment is attained. In addition, an initial employment of about 940 people will be required to supply the pulpwood required by the mill, increasing to near 1,900 as the demands of the mill increase. However, these indirect employees and their families (amounting to about 3,000 people initially and increasing to 6 or 7 thousand) may be expected to reside anywhere within a 50 to 100 mile radius of the mill site with the heaviest concentrations tending to be nearer the mill.

Chickasawhay Sub-area

This sub-area is comprised of five Mississippi counties as follows: Clarke, Greene, Lauderdale, Newton, and Wayne. All population centers of current significance within this drainage area are located within one of the above five counties. The city of Meridian, located in Lauderdale County, is the only major growth center in the area.

The population of the Chickasawhay Sub-area expected to use group facilities for water supply and waste disposal in the future is 128,700 in 1980 and 204,000 in 2015.

Waste-discharging industry groups of significance within the Meridian complex and the estimated employment for each are presented in Table 12.

Two previous reports prepared for the U. S. Army, Corps of Engineers, Mobile District, provide a detailed analysis of the economy of this area and an evaluation of the need for and value of storage for quality control. These are a report on the water supply aspects of the Okatibbee Creek reservoir (6) and another on the water quality control aspects of the same reservoir (18).

TABLE 12

EMPLOYMENT PROJECTIONS FOR MAJOR WASTE-DISCHARGING MANUFACTURING INDUSTRY GROUPS WITHIN THE MERIDIAN, MISSISSIPPI, COMPLEX

Industry Group		Estimated Employment			
SIC Code(s)	Abbreviated Name	1960	1965	1980	2015
2011 & 13	Meat and sausage	150	150	170	300
2022, 24, & 26	Natural cheese, ice cream and fluid milk	153	160	180	320
2661	Building paper, etc.[1]	498	540	790	1,440
2952	Asphalt felts and coating	88	100	120	240

[1]May be assumed to include future pulp and paper mill and related employment.

Projections of population contained in this report are based on the Economic Base Study and are somewhat different from those contained in the two previously cited reports. These differences, however, are actually minor and do not materially affect conclusions with regard to water needs.

Coastal Sub-area

This sub-area is comprised of four Mississippi counties as follows: George, Harrison, Jackson, and Stone. Most of the economic and demographic growth in the area, however, is concentrated in a band along the Gulf coast where Jackson County only (and the Pascagoula complex) is materially and directly affected by the Pascagoula River and associated estuaries. The Economic Base Study presents an aggregated picture of a Pascagoula-Biloxi-Gulfport SMSA because of the economic interdependencies which tend to tie this entire complex together. Gulfport and Biloxi, however, are physically separated from Pascagoula and the Pascagoula River Basin, per se, by the Biloxi River and Tuxachanie Creek drainages and Biloxi Bay.

The population of the entire Coastal Sub-area, as defined above, expected to use group facilities for water supply and waste disposal in the future is 328,100 by 1980 and 729,000 by 2015.

The major growth within this area has occurred in the past and is expected to continue into the future as a strip-development along the Gulf coast. The results presented in the Economic Base Study indicates an expected interdependency and a high degree of geographic continuity of growth along this coastal strip from the Pascagoula complex on the east to the Gulfport complex on the west. Under the assumption that this anticipated growth pattern is correct, it is patently impossible to make a discrete economic and demographic analyses of the various water source areas without some error becoming involved. However, because of the need to obtain the best individual estimates possible for the Pascagoula complex and the Biloxi-Gulfport complex (including Long Beach and west to Bay St. Louis and adjacent developments), a separate analysis and presentation is made as follows:

1. The Pascagoula complex:

The Pascagoula complex, as defined for purposes of this report, lies entirely within Jackson County and is the only growth area in the county except for the D'Iberville-Ocean Springs center which is in the Biloxi-Gulfport complex. Analysis and projection of available data produce the estimates presented in Table 13 as the population of the Pascagoula complex expected to use group facilities for water supply and waste disposal.

Industries which may be expected to add to the need for water in terms of both withdrawal and in-place uses have been examined in

terms of employment and the expected magnitude of each industry group in the same terms is presented in Table 14.

2. The Biloxi-Gulfport complex:

For the purposes of this report, this complex includes the Ocean Springs-D'Iberville area in Jackson County, the entire urbanized portion of Harrison County (including related suburban areas), and the Bay St. Louis area of Hancock County. Estimates presented in Table 15 represent the sector expected to use group facilities for water supply and waste disposal.

Industries which may be expected to add to the need for water in terms of both withdrawal and in-place uses are presented in Table 16 in terms of estimated employment.

TABLE 13

POPULATION BASE FOR THE ESTIMATION OF GROUP WATER NEEDS OF THE PASCAGOULA COMPLEX WITHIN THE PASCAGOULA RIVER BASIN, COASTAL SUB-AREA, MISSISSIPPI

	1960	1965	1980	2015
Estimated population	45,800	56,100	91,000	258,000

TABLE 14

EMPLOYMENT PROJECTIONS FOR MAJOR WASTE-DISCHARGING MANUFACTURING INDUSTRY GROUPS WITHIN THE PASCAGOULA, MISSISSIPPI, COMPLEX

Industry Group		Estimated Employment			
SIC Code (s)	Abbreviated Name	1960	1965	1980	2015
2031 & 36	Seafoods and fish (canned, cured, fresh, or frozen)	50	60	70	100
2094 & 95	Grease and tallow, and animal fats	350	440	520	700
2621	Paper mills	1,720	2,200	3,240	7,100
2813 & 19	Industrial gasses and chemicals	180	270	450	2,400
2822	Synthetic rubber	60	80	160	900
2911	Petroleum refining	150	530	1,570	3,100
	Total	2,510	3,580	6,010	14,300

TABLE 15

POPULATION BASE FOR THE ESTIMATION OF GROUP WATER NEEDS
BILOXI-GULFPORT COMPLEX WITHIN THE PASCAGOULA BASIN AREA
COASTAL SUB-AREA, MISSISSIPPI

	1960	1965	1980	2015
Estimated population	135,110	158,900	231,200	469,000

TABLE 16

EMPLOYMENT PROJECTIONS FOR MAJOR WASTE-DISCHARGING MANUFACTURING
INDUSTRY GROUPS WITHIN THE BILOXI-GULFPORT, MISSISSIPPI, COMPLEX

Industry Group		Estimated Employment			
SIC Code	Abbreviated name	1960	1965	1980	2015
2011 & 2013	Meat and sausage	40	50	60	100
2024 & 2026	Fluid milk and ice cream	120	150	170	300
2031 & 2036	Seafoods and fish (canned, cured, fresh and frozen)	1,260	1,540	1,850	2,500
2042	Animal feeds	180	250	270	400
2821 & 2861[1]	Plastics and synthetic resins	30	100	160	700
2871	Fertilizer	20	30	100	400
3352[2]	Aluminum extrusion	70	90	170	400
	Total	1,720	2,210	2,780	4,800

[1]Also includes a relatively small employment in Group 2851, paints.

[2]Also includes a relatively small employment classified by the Mississippi Manufacturers Directory as in Groups 3321, -61, and -62, gray iron foundry and non-ferrous metal castings.

VII. WATER REQUIREMENTS

Present Municipal & Industrial Water Supply Requirements

There are 36 municipal supply systems in the Leaf River sub-basin, 19 in the Chickasawhay River sub-basin and 17 in the Lower Pascagoula sub-basin. These systems serve approximately 220,000 people in the Pascagoula River Basin with an estimated average per capita demand of 130 gallons/day. In addition to the above mentioned systems, the city of Mobile, Alabama, (outside the basin) currently withdraws an average of 33.5 mgd from a reservoir on Big Creek in the Lower Pascagoula sub-basin. Pertinent data relating to these systems are presented in Appendix I.

Ground water is the major source of supply for most municipal systems, the exceptions being Meridian, Mississippi, and the above mentioned supply of Mobile, Alabama.

Industry in the Pascagoula River Basin uses only ground water with the exception of two establishments at Hattiesburg and a number of industries in the Pascagoula area which use surface water or a combination of surface and ground water. Water consumption for major industrial water users in the basin is presented in Appendix II.

In the Hattiesburg area, present industrial use of surface water is approximately 83 mgd, all of which is used for cooling. Of this, 75 mgd is utilized in the production of power and returned directly to the Leaf River. The remaining 8 mgd is utilized by an industry producing naval stores and derivatives and is returned, along with process wastes, to the Bowie River just above its confluence with the Leaf. Some surface water is used for sand and gravel washing, but is returned directly to the stream

Current industrial demands for surface water in the Pascagoula area require approximately 52 mgd. A paper mill is presently using 45 mgd from the Escatawpa River for cooling and process water. Several industries in the area obtain a total of 7.2 mgd from the Jackson County Industrial Water Supply System. This utility, which has a present capacity of 15 mgd, draws water from the Pascagoula River above the limits of salt water intrusion. In addition, salt water is used for both cooling and as a source of raw material in the Bayou Casotte area. The former use is presently limited to 3.6 mgd while the latter use is 250 mgd in the production of magnesium hydroxide. A large oil refinery on Bayou Casotte area uses 18 mgd of salt water from Mississippi Sound for the dilution of its wastes prior to discharge.

Investigations by the Department of Agriculture revealed that agricultural use of water for supplemental irrigation as a production practice is limited and has no appreciable effect on the water resources of the Basin. However, the studies indicate there is a need

for supplemental water in most years for the optimum production of crops.

Future Municipal and Industrial Water Supply Requirements

General

From projections based on the "Economic Base Study" (16), increased water use expected in the basin by the year 2015 will generally be supplied from ground-water sources. Exceptions to this will include the Hattiesburg, Laurel, Meridian and Pascagoula, Mississippi, areas. Appendix III presents projected ground- and surface-water requirements for selected communities in the basin.

Production of crops and pastures could be increased by the use of supplemental water; however, there is no indicated need for it. Agricultural use of water for supplemental irrigation has been decreasing in the past and will probably constitute no problem in the next 10 to 15 years.

Leaf River Sub-basin

The total need for water in the Hattiesburg area is projected to be as great as 184 mgd by the year 2015. Of this, 24 mgd is required for municipal and industrial use, excluding large industrial cooling water demands. Since present ground-water facilities have a capacity of approximately 18 mgd and wells capable of delivering 2,000 gpm are possible, it is expected that this 24 mgd will be obtained from ground-water sources, leaving a demand of 160 mgd from surface waters.

Included in the projected need of 160 mgd from surface waters there is 75 mgd of surface water now being used by a steam powerplant for cooling water. Although no future hydroelectric power is anticipated in the basin, additional thermal electrical plants, depending upon future power demands and power markets, are likely to be located within the basin. Accordingly, additional surface waters may be required in the future for this purpose. However, no increase in demand has been evaluated.

It is expected that the naval stores and derivatives industry will require approximately 13 mgd of cooling water by 2015 and 72 mgd additional will be needed for process and cooling water if a proposed paper mill at McCallum, Mississippi, is constructed. These demands can be met by direct withdrawal from the Leaf River except that the paper mill's withholding of return wastes flows (46 cfs) will cause a deficit in stream flows needed below the mill.

An analysis of low-flow data for the Leaf River in the Hattiesburg area indicates that when there is a consumptive use caused by

temporary withholding of wastes flows back to the stream it is not possible to furnish directly from the stream the 160 mgd needed for water supply. The deficit that must be made up from reservoir storage is 46 cfs in order to meet water supply needs and maintain a minimum flow of 368 cfs at the Hattiesburg gage. With this flow and an addition of 31 cfs below the Hattiesburg gage from ground water, the temporary withholding of 46 cfs by the mill will still make it possible to maintain minimum needed flows below the mill of 353 cfs.

It is recommended that the proposed Bowie Creek reservoir provide for releases to 46 cfs (30 mgd) to insure the required minimum flow of 368 cfs at the Hattiesburg gage.

In the Laurel area, projected requirements of 45 mgd dictate the need for a surface-water supply as recommended in the report on Tallahala Creek previously submitted to the Corps of Engineers (13).

Chickasawhay River Sub-basin

Water consumption in Meridian, Mississippi, is projected to increase to 24.9 mgd by the year 2015. This will be supplied by the Okatibbee Creek reservoir now being constructed by the Corps of Engineers (6).

Lower Pascagoula Sub-basin

Projections indicate that demands for fresh water in the Pascagoula, Mississippi, area would be 344 mgd by the year 2015. Most of this need will be supplied from surface sources since only 20 mgd of ground water is available. Although approximately 11 mgd is presently obtained from ground-water sources, future demands in excess of 5 mgd seem unlikely if sufficient quantities of good quality water are available from municipal surface-supply systems.

Storage in the proposed Corps of Engineers impoundment on the Escatawpa River near Harleston limits the quantity of water available for a water supply to 100 mgd if flows recommended for water quality control in a later section of this report are provided. The storage required for this purpose would be 30,300 acre-feet per year, and the release would be constant.

At present, permits allowing the average withdrawal of approximately 53 mgd from the Escatawpa River have been issued by the Mississippi State Board of Water Commissioners. Present plans for enlarging the existing supply from the Pascagoula River by developing another source on Big Cedar Creek above Cumbest Bluff would bring the surface supplies to 153 mgd. This with the possible 100 mgd from the Harleston reservoir leaves a demand of 86 mgd in 2015 to be satisfied from further development of supplies from the Pascagoula or another tributary above Cumbest Bluff other than Big Cedar Creek.

Use of salt water from the Bayou Casotte-Mississippi Sound area is expected to increase for cooling and raw material demands. No problems should be met in connection with this use.

VIII. WATER QUALITY CONTROL

Surface waters of the Pascagoula River Basin are used for municipal and industrial supplies, stock watering, fish and game propagation, a small commercial fishery, recreation and the disposal of municipal and industrial wastes. Their use for irrigation is not significant. The estuaries of the Pascagoula and Escatawpa Rivers are used for navigation.

At the present time there is little need for surface water quality control in the Pascagoula River Basin in order to make supplies available for municipal and industrial use. In most areas ground water is the present source of supply and will be in the future. Exceptions are discussed below.

In the Hattiesburg area, it is projected that a surface-water supply will be required in the future; and it is proposed that the water be supplied to the Hattiesburg "use area" from a multipurpose reservoir on the Bowie Creek. The usefulness of the stored water is dependent on adequate treatment of municipal and industrial wastes and prevention of diversion or withholding of flows below the minimum flow needs established in this report. Stream flow regulation for water quality control will not be required.

In the Chickasawhay River sub-basin, where surface-water supplies may be needed in the future in Clarke and Greene Counties, there is the possibility that water quality control by flow regulation in addition to the prerequisite of adequate treatment of wastes will be needed. This need would be in addition to that which will be met with releases from the Okatibbee Creek reservoir now under construction. Storage for this purpose could be provided in Corps of Engineers future reservoirs in the area or in upstream watershed projects of the Department of Agriculture in the Chunky River watershed and Tallahatta Creek watershed.

The Pascagoula River is presently a source of an industrial water supply and projections show that it will be further drawn upon for both municipal and industrial supplies. The continued good quality of these waters above the salt-water intrusion limit is, of course, dependent upon adequate treatment of future wastes discharged farther upstream.

The Bureau of Sport Fisheries reports that, in 1965 the fresh-water fishing demand in the basin was 1,252,222 man-days per year, while the fishing capacity of all streams and freshwater lakes was 1,184,325 man-days per year (19). For the year 2015, the projected demand is 2,511,603 man-days. These figures indicate the pressure which the growth of the area is expected to exert on the basin's capacity to satisfy the demands of fishermen. The major portion of this fishing is by sportsmen, but the basin does support a small commercial freshwater fishery which harvested 253,100 pounds of fin fish with a value of $69,800 (ex-vessel value) in 1960-1961.

The water quality control which will result from the Okatibbee Creek dam now under construction, along with adequate treatment of wastes at Meridian, will enhance both sport and commercial fishing in the Chickasawhay River sub-basin. The proposed Tallahala Creek dam and the concomitant adequate treatment of wastes in the Laurel complex will have the same result in this area. Adequate treatment of wastes originating in the Hattiesburg area, a necessity if the river is to be used for a surface-water supply, will enhance fishing below that city.

In the Water Resources section of this report, the poor summer conditions of the Escatawpa River and Pascagoula River estuaries have been described. Although the demand for sport fishing in the coastal area is now satisfied, the estuaries are important to the commercial marine fisheries of Mississippi. Crabs, oysters and several valuable species of fish are dependent wholly, or at some life stage, upon the estuarine environment for survival (19). Releases for stream flow regulation from the proposed Harleston impoundment and adequate treatment of the present waste loads in the Escatawpa estuary would alleviate the immediate pollution problem. In the future, other methods of waste disposal may have to be found.

Pascagoula Bay, the condition of which has been described in the section on water resources, is an oyster growing area now closed because of the poor sanitary quality of its waters due to pollution from the Pascagoula River. The water quality control measures to be applied in the upstream projects along with more uniform flows and adequate wastes treatment or other methods of control of wastes will improve the water quality for oyster production.

According to the Bureau of Outdoor Recreation, water-dependent and water-enhanced recreational activities, excluding fishing and hunting, constitute close to 30 percent of the total outdoor recreation in the Pascagoula River Basin. The 1965 demand is 9,198,600 activity occasions per year for swimming and boating while 1,070,900 units per year can be expected from the present supply. In 2015 the demand for swimming and boating will be 56,254,300 activity occasions. These sports demand clean water, and water quality control will be necessary for the full exploitation of the basin's water resources.

Present Sources of Pollution

The principal sources of pollution in the Pascagoula River Basin are municipalities, industries, oil field operations and sand and gravel operations.

An inventory of municipal waste discharges by sub-basin is given in Appendix IV. A similar inventory of industrial waste discharges is presented in Appendix V. Municipal and industrial waste discharges are shown in Exhibits 8, 9, 10 and 14 of Appendix VIII. A summary of waste discharges by sub-basin is presented in Table 17.

TABLE 17

MUNICIPAL AND INDUSTRIAL WASTE DISCHARGES
PASCAGOULA RIVER BASIN

Sub-basin	Area	Population Equivalent Discharged (in thousands)[1]		
		Municipal	Industrial	Total
Leaf	Hattiesburg	61	97	158
	Laurel-Ellisville	20	12,001[2]	12,021[2]
	Leaf sub-basin	89	12,099[2]	12,188[2]
Chickasawhay	Meridian	5	43	48
	Chickasawhay sub-basin	10	43	53
Lower Pascagoula	Pascagoula Complex	8	635[3]	643[3]
	Lower Pascagoula sub-basin	12	649[3]	661[3]
Total for Basin		111	12,791[2,3]	12,902[2,3]

[1] Five-day, 20°C, Biochemical Oxygen Demand expressed as a population equivalent.

[2] Includes the maximum waste discharge observed from the wood products plant at Laurel. Loads from this plant, calculated from stream data, range from 120,000 to 12,000,000 P.E.

[3] Includes waste discharges from fish reduction plants at Moss Point which are operated during the period mid-April to November.

Since the 1965 survey was made, the cities of Hattiesburg and Laurel have completed oxidation lagoons which treat a portion of the wastes in these areas. The Hattiesburg lagoon receives the city's entire municipal waste. The new lagoon at Laurel receives the waste from 12,000 people which was previously discharged to Tallahala Creek untreated. A large poultry processing plant has been established in Laurel since the survey and discharges its waste to an existing lagoon. Waste discharged to the Leaf River and Tallahala Creek have been reduced by approximately 55,000 and 11,000 P.E., respectively.

Oil field operations are the source of brines which present a pollution problem in the Pascagoula River Basin. A belt of fields extends from Simpson County in Mississippi across the basin into Choctaw County in Alabama. Another area lies in the southern part of Lamar and Forrest Counties, and a third is in Mobile County in Alabama. Scattered over these areas are 51 fields in Mississippi and one in Alabama. There are about 1,500 individual wells in these fields. The brines are disposed of either by reinjection into approved strata or by retention in open pits. The latter method results in seepage into streams, overflows, illegal releases, etc. This is reflected in higher than normal chlorides content in some streams and occasional "slugs" of brine which intermittently raise chloride concentrations to objectionable levels.

Sediment problems in the Pascagoula River Basin have been identified by the Department of Agriculture and the Bureau of Mines. Investigations by the Department of Agriculture show that changes in the agricultural economy in the basin over the past 20 years have resulted in a low amount of sediment entering the stream system. Under present conditions, the estimated average annual sediment discharge of the Pascagoula River at the Merrill gage is about 3.6 million tons (or 0.4180 acre-feet) per square mile. The average annual sediment discharge of Pascagoula Basin streams studied ranges from 150 to 940 tons (or 0.12 to 0.72 acre-feet) per square mile of drainage area. The sedimentation report prepared by the Soil Conservation Service of the Department of Agriculture is contained in Appendix D.

County highway maps and available topographic maps show more than 300 locations of sand and gravel pits in the Mississippi portion of the basin. The majority of these are intermittently operated by towns and municipalities or by private owners for private use. Investigations by the Bureau of Mines, contained in Appendix L, show the largest output has been from the Hattiesburg area. In this area, on the Bowie River, gravel is obtained by barge-mounted pumps. Large volumes of water heavily laden with silt, sand and minor clay are released to bottomlands and exhausted portions of pits from the gravel washing operations. These pits open to the Bowie River. Silt and sand have caused damage to the benthic fauna of the Bowie River directly above Hattiesburg (7).

Water Quality Criteria

The use of water will almost inevitably result in the production of some liquid waste which, even after a high degree of treatment will degrade the quality of the receiving stream. As populations grow and industries expand, waste discharges and their effect on the stream increase.

The pollutional effect of waste discharges on a receiving stream is the function of a number of variables. The main assumptions used in the evaluation of the need for water quality control storage or regulation below the proposed reservoirs in the Pascagoula River Basin are as follows:

1. That characteristics of wastes discharged to the receiving stream will continue to be primarily organic in nature.

2. That specific mineral and/or organic toxicants will not be a significant problem.

3. That maintenance of a minimum concentration of 4.0 mg/l of dissolved oxygen will provide reasonable protection for fish and other aquatic life.

4. That water released from a reservoir for water quality control will have a D.O. concentration equal to or greater than 80 percent saturation, or a minimum of 6.0 mg/l.

Quality control needs have been based on the minimum D.O. concentrations of 4.0 mg/l and were determined for the critical reaches below the five early action reservoirs. Solutions of the oxygen-sag equation arrived at graphically or by a computer were used to determine the quality requirements in the vicinity of Laurel and Hattiesburg, Mississippi. The method of LeBosquet and Tsivoglou (20) was utilized in the analysis of water quality needs in the Escatawpa Estuary area.

The minimum flows recommended are those which will maintain a D.O. level greater than 4.0 mg/l at the critical point in the stream, except for a low flow period expected to last for seven consecutive days once in ten years. Should conditions exist that would cause the natural flow of the stream to fall below the expected seven-day, ten-year low flow, D.O. levels would fall below 4.0 mg/l but would not approach conditions of septicity.

Calculations were based on the premise that municipal wastes would be treated to remove 85 to 90 percent of organic matter and industrial wastes would receive 85 percent treatment unless otherwise noted. These degrees of removal are the average that can be expected from secondary treatment plants in the southeast at present.

The projections for future waste loads were made with the use of population projections for municipalities and employment projections plus an allowance for technological advancement for industries. Table 18 shows the present and projected loadings for the four critical areas of the basin, expressed as pounds per day of 5-day B.O.D.

TABLE 18

PRESENT AND PROJECTED WASTE LOADS FOR CRITICAL AREAS
PASCAGOULA RIVER BASIN
1965

	Raw Load (lbs/day BOD_5)		Residual Load (lbs/day BOD_5)	
	1965	2015	1965	2015
Hattiesburg Area	28,000	81,000	27,000	10,000
Possible paper mill (McCallum)	---	78,000	---	4,350[1]
Laurel-Ellisville Area	7,500	22,000	3,800	3,300
Particle board industry	[a]	---	[a]	6,700[1]
Meridian Area	15,500	60,000	8,100	8,000
Pascagoula Area	140,000	870,000	109,000	128,000

[1]Allowable load based on critical flows and temperature conditions.

[a]The 1965 stream survey showed wastes discharged to range from 25,000 to 2,000,000 lbs/day during one week of the sampling period.

Although natural background coliform density is high throughout the basin, it is expected that adequate treatment and chlorination of all effluents containing domestic sewage and control of other sources of pollution such as agriculture and wildlife will allow recreational usage (water contact sports) in reservoirs developed in the basin.

Flow Regulation for Water Quality Control

General

Under provisions of Section 3 of the Federal Water Pollution Control Act, as amended (33 USC 466 b (b)), consideration must be given to the inclusion of storage for regulation of streamflow for the purpose of water quality control in the survey or planning of a reservoir by any Federal agency. The law expressly states that any such storage and water releases shall not be provided as a substitute for adequate treatment or other methods of controlling wastes

at their sources. Five such reservoirs in the Pascagoula River Basin are being considered for early action by the U. S. Army Corps of Engineers. Based on stream surveys conducted, as presented herein, in the winter and summer of 1965, present waste loadings and the assimilative capacities of the critical reaches below these dam sites were determined. With this information, minimum stream flows needed to correct present conditions or to care for projected waste loads were estimated.

Discharge of wastes, even when treated to the maximum economically feasible and practical limit, will cause an unsatisfactory quality condition in receiving waters when their waste assimilative capacity is exceeded. Thus the maximum capacity of a stream may be insufficient to care for a highly treated waste. This condition, however, usually occurs during periods of low flows and may be avoided by the addition of water to maintain flows at higher levels. Recognition must be given to the need for required flows in receiving streams if the water quality is to be maintained at acceptable levels.

Quality objectives are based principally on dissolved oxygen concentration (D.O.) and confirmed coliform bacteria density. Storage provided for stream flow regulation should maintain an average minimum D.O. concentration of 4.0 mg/l at the point in the receiving waters where the maximum pollution is felt when base flow is at or in excess of the 7-day, 10-year flow.

<u>Leaf River Sub-basin</u>

An analysis based on projected waste loads and water supply requirements to the year 2015 indicates that the Leaf River below Hattiesburg will require no flow regulation for water quality control under the following conditions:

1. That municipal and industrial wastes discharged to the Leaf River in the vicinity of Hattiesburg will not exceed 10,000 lbs/day of 5-day B.O.D.

2. That the proposed Corps of Engineers impoundment on Bowie Creek will satisfy the consumptive surface-water supply requirements.

3. That the waste discharged to the Leaf River from a proposed paper mill at McCallum will not exceed 4,350 lbs/day of 5-day B.O.D. when the unregulated flow at the Hattiesburg gauge is 322 cfs. During periods when flow in the river is in excess of 322 cfs a portion of the wastes being retained in holding ponds could be released.

4. That the waste from a proposed paper mill at McCallum will have a D.O. of 2 mg/l when discharged.

5. That a flow in excess of 353 cfs will be maintained below McCallum.

6. That municipal and industrial wastes discharged to Tallahala Creek will not exceed 10,000 lbs/day of 5-day B.O.D. in the vicinity of Laurel.

7. That the proposed storage facility on Tallahala Creek is constructed.

The above discharges are the projected 2015 residual waste loads assuming 90 percent B.O.D. removal in municipal lagoons and 85 percent B.O.D. removal by industrial treatment facilities, except in the case of the proposed paper mill at McCallum. Increased treatment coupled with the holding of a portion of these wastes during low-flow conditions, as dictated by proposed design criteria, provides the load indicated. Under these conditions, average minimum D.O. concentrations should always remain at or above 4.0 mg/l at the point in the Leaf River where the maximum pollution is felt.

The minimum daily flow of record (322 cfs) was used for determining storage needs since water supply is the water use proposed. The natural unregulated flow of 322 cfs at Hattiesburg includes 6 cfs of ground water added through sewers above the gage. This low flow is further augmented downstream with an additional 31 cfs originating from ground water sources to yield a minimum daily flow of 353 cfs, the amount needed below McCallum as mentioned above.

Flow regulation for water quality control on Tallahala Creek has already been recommended (13). The proposed facility would provide a minimum flow of 50 cfs at Laurel during the critical summer months from an annual draft-on-storage of 13,650 acre feet.

Projected through 2015 there will be no other area or reach in this sub-basin where flow regulation for water quality control will be needed.

Chickasawhay River Sub-basin

Water quality on Okatibbee Creek and the Chickasawhay River between Meridian and Quitman, Mississippi, should be improved to an adequate level of quality when construction of the dam on Okatibbee Creek is completed. Flow regulation for water quality control has been recommended (18), and a structure is presently under construction for flood control, water supply, stream flow regulation and recreational use. The reservoir will provide storage for 21,300 acre-feet per year of water for water quality control.

Additional augmentation of flow for water quality control in this sub-basin should not be necessary through the year 2015 unless a paper industry develops in the Enterprise-Quitman area. Since no plans for such an industry have reached the positive stage and the Corps of Engineers is not considering the possible dam sites in the Chunky Creek

watershed for early action, no analysis of needs for water quality control considering a paper mill has been made for this reach. In the event plans develop for a mill in this area, further studies will be necessary.

Lower Pascagoula Sub-basin

Except for the Pascagoula-Escatawpa estuary, no flow regulation for water quality control should be necessary in this sub-basin to the year 2015. Projections indicate that waste loads which will be discharged to the various streams in the sub-basin should not cause D.O. concentrations to drop below an average value of 4.0 mg/l, even during low-flow conditions, if municipalities and industries provide adequate treatment.

Present industrial sources discharge, during the summer months, approximately 623,000 P.E. into the Escatawpa estuary after little or no treatment. In the area below the industrial outfalls, D.O. concentrations fall below 4.0 mg/l for months at a time and conditions become septic for extended periods during the summer.

Analysis of water quality data in the Escatawpa estuary by the method of LeBosquet and Tsivoglou (20) indicates that even with adequate treatment of present wastes, D.O. concentrations would be well below 4.0 mg/l during low-flow conditions. With adequate treatment of present wastes, a minimum flow of 805 cfs during the summer months would be required at the town of Orange Grove, Mississippi, in order to assure that D.O. concentrations do not fall below 4.0 mg/l. Since the 7-day, 10-year low flow at mile 14 on the Escatawpa River above Orange Grove (and the paper mill's water intake) is 215 cfs, flow augmentation for water quality control is necessary to insure that a minimum D.O. concentration of 4.0 mg/l is maintained in the Escatawpa estuary. Required minimum flows at the town of Orange Grove for each month of the year are presented in Exhibit 7. Storage required for this purpose in the proposed Harleston reservoir would be 228,500 acre-feet per year. The table below shows the expected releases which would be made from the impoundment.

TABLE 19

EXPECTED MONTHLY RELEASES FOR WATER QUALITY CONTROL
FROM HARLESTON RESERVOIR
cfs

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Max.	42	0	110	364	521	625	607	688	684	428	334	96
Min.	2	0	6	46	242	388	337	364	397	267	169	16

Storage to provide flows greater than those indicated in Exhibit 7 cannot be provided in the proposed Corps of Engineers multipurpose impoundment at the Harleston dam site after storage for a 100 mgd municipal and industrial water supply is provided. Therefore, future pollutional loads in the Escatawpa estuary area in excess of 16,000 lbs/day of 5-day B.O.D. (present loads after adequate treatment) will require disposal by other means, such as piping to the Pascagoula River and/or Mississippi Sound.

Projections of wastes in the Pascagoula, Mississippi, area indicated that loads in excess of 5,000,000 P.E. are to be expected by the year 2015. Assuming that 50 percent of these wastes will originate in the Bayou Casotte industrial area, the remainder of the load could probably be discharged to the Pascagoula-Escatawpa estuary after adequate treatment without causing D.O. concentrations to fall below 4.0 mg/l except during low-flow conditions. Construction of sills on the West Pascagoula River and inter-connecting waterways to allow the entire 7-day, 10-year low flow of the Pascagoula to remain in the river proper should provide sufficient dilution and/or dispersion of the wastes to insure that average minimum D.O. concentrations do not fall below 4.0 mg/l.

IX. BENEFITS

Municipal and Industrial Water Supply

General

The economic development of any area is largely dependent upon the water resources of that area. It follows that any effort at improving this natural resource that results in a copious water supply of good quality which is economically assessible is a definite tangible benefit to the area. The scope of this benefit is directly dependent upon the needs of the area and is logically equated to the local investment potential. For any of the several purposes allocated to a large water supply, the present worth of the quantity of water available for a specific purpose is that amount local interest would have to spend developing the same quantity in the absence of the multipurpose project. Since there are usually several methods of developing single-purpose water supplies, the true value of water stored by a multipurpose project for a specific purpose is the least costly of the several possible single-purpose alternates for the particular supply.

For Federal projects, such as those developed by the U. S. Army Corps of Engineers which are usually multipurpose, the benefits, both local and widespread, are the sum of the least costly of the alternates for each of the purposes allocated to the project. In arriving at the value of water stored by a Federal project, all cost must be "normalized" by using current prices for capital cost and the appropriate interest rate and amortization period for both the Federal project and the locally developed alternates. The U. S. Army Corps of Engineers has proposed two multipurpose dams in the Pascagoula River Basin which can provide water supply storage considered of value to the surrounding area. In each case, since there was not a completely assured alternate to the proposed Federal multipurpose project, all alternates, including a single-purpose project, were assumed to require a 100-year life with 3 1/8* percent financing. Staggered construction was considered, along with required future replacements. The total costs were all discounted to present values and worked into an annuity which could then be added to the annual operating costs, such that the total value could be expressed as an annual dollar figure. This methodology was used in arriving at values for water storage in the Pascagoula River Basin area. These values are commonly referred to as "benefits".

Hattiesburg Area

Economic growth projections for the Hattiesburg area indicate that a probable surface water demand of 160 mgd will occur by 2015.

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*Calculations for benefit-cost analysis in the main report use the more recently recommended value of 3 1/4 percent.

Of this amount, 75 mgd is now being used and will continue to be used by a power plant for cooling purposes. The remaining 2015 requirement of 85 mgd is based on an estimated need for 13 mgd in the Hattiesburg area and a water supply of 72 mgd for a possible pulp and paper mill at McCallum with a projected capacity of 1,200 tons of paper per day. The Leaf River could support this need except for consumptive uses (withholding of return waste flows) during low flow stream conditions. This consumptive use of a maximum of 46 cfs must be replaced by release from storage when the natural, unregulated flow at Hattiesburg drops to 322 cfs, minimum daily flow of record.

While the FWPCA's 50-year projections indicate a future need for only 85 mgd, the proposed Corps of Engineers multipurpose project, designed for 100 years, on Bowie Creek can furnish 108 mgd for water supply. Local interest has assured reimbursement for the entire 108 mgd. Consequently, the benefit for this 108 mgd as determined by the "least cost alternative" method is $105,000 per year. This benefit was determined by pricing the most likely alternate local interest would pursue in the absence of the Federal project. The Federal multipurpose project conceptually has two methods of operation: Storage of the entire 108 mgd supply with an arrangement by which local interest withdraws, as needed, directly from the reservoir and pipes the water of relatively good quality to the use area; or The release of the necessary amounts of water to sustain the stream flow during dry periods at a level which will satisfy the water supply demands on it. Almost without exception, the total storage figure (108 mgd) is provided for in the multipurpose project and this is the amount of water for which local interest must pay. To assign a benefit to this water, however, consideration must be given to all realistic alternates that will achieve the same amount of water of equal quality delivered to the use area. In this particular case it was found that to provide 108 mgd local interest would need only supplement the river flow with a maximum of 53 mgd at times of low flow. The 53 mgd is the sum of 30 mgd (the deficit projected by the FWPCA) and 23 mgd (the surplus of 108 mgd over 85 mgd). The several alternates and their costs are as follows:

1. A 53 mgd single-purpose reservoir located near above site. This reservoir would supplement the river flow when required to make available 108 mgd continuously at the use area. The cost is $105,000 per year. This is the "benefit" of the 108 mgd stored by the multipurpose project for water supply.

2. A 53 mgd ground-water supply used concurrently with development of 55 mgd from the Leaf River. The 55 mgd would be pumped from the river and the 53 mgd would be piped from the well field to the use area. This alternate has a cost of $248,000 per year.

3. A 53 mgd ground-water supply used to directly augment stream flow. This system would be operated only during periods of low stream flow so that 108 mgd could be taken at all times from the stream at the use area. This alternate has a cost of $118,000 per year.

Laurel Area

The report, "Municipal and Industrial Water Supply and Water Quality Control Study, Tallahala Creek Watershed, Jones County, Mississippi," (13) treats the cost benefits of storage for water supply in the proposed Corps of Engineers multipurpose impoundment on Tallahala Creek. The annual present value of water supply storage in the proposed Corps of Engineers project designed to supply an average of 45 mgd is estimated at a minimum of approximately $164,000. This report has been transmitted to the Corps of Engineers.

Meridian Area

As has been previously mentioned, a U. S. Army Corps of Engineers impoundment is now under construction on Okatibbee Creek. The water supply storage is designed to supply, at the end of the economic life of the project, an average of 25 mgd of municipal and industrial water with an annual value of $102,000. This value was based on a single-purpose water supply reservoir.

Pascagoula Area

The future demand for surface water supplies in the Pascagoula complex will exceed the present and planned development by 186 mgd by the year 2015. Of this amount, only 100 mgd can be furnished from storage in the proposed Corps of Engineers reservoir at Harleston. In order to determine the cost benefit of this storage, five feasible alternates were considered. These are:

1. A single-purpose reservoir located at Harleston with the water to be piped to the use area at Pascagoula. This alternate will have a cost of $890,000 per year.

2. A 100 mgd ground-water supply system developed in a five-square-mile area located some ten miles from the coast, the water to be collected and piped to the use area. The cost of this alternate is $592,000 per year.

3. A 100 mgd surface-water supply taken from the Pascagoula River near Cumbest Bluff and piped to the use area. This would result in a cost of $460,000 per year which is found to be the "benefit" or the true value of the 100 mgd for water supply to be provided by the multipurpose project.

4. A 75 mgd surface system consisting of economically balanced storage facilities and pumping arrangements supplemented by a 25 mgd ground-water supply. Both the surface- and ground-water supplies would be piped to the use area. The cost of this system would be $496,000 per year.

5. The above 75 mgd system supplemented by a 25 mgd surface supply taken from the Pascagoula River near Cumbest Bluff. Here again the supplies would be piped to the use area. This arrangement would have a cost of $505,000 per year.

Water Quality Control

Water quality control benefits are the net contribution to the economy, public health, the enjoyment of water for recreation and the increase in any use of water which is affected by a change in its quality.

If the discharge of wastes prevents the use of a stream for commercial or recreational fishing, there is an economic loss plus an intangible one. Should wastes cause bacterial contamination of a stream, there is a potential public health hazard and an economic loss due to the prohibition put upon the use of its waters for recreation. Such pollution may also make the stream undesirable or unuseable as a source for public water supply. Pollution often makes a stream aesthetically undesirable, an effect which can be important but difficult to evaluate.

If a stream is used for the transport of wastes to the extent that all other uses are prohibited, a limit may thus be imposed on further industrial or demographic growth of the area. Where present pollution so taxes a stream that no further introduction of wastes is allowable without damaging results, a similar situation exists.

Since no adequate means have been devised to evaluate directly all of the benefits which accrue from water quality control, the cost of achieving the same results by the most likely alternative in the absence of the project under study has been used as the minimum value of benefits.

In the Pascagoula River Basin the principal effect of wastes introduced to streams has been damage to their capacity to support fish life, to their use for recreation, and to their aesthetic appeal. In the Pascagoula area there has been the additional damage to the shellfish industry due to the prohibition of oyster harvesting because of bacterial contamination of Pascagoula Bay.

The foregoing sections of this report show that there are three areas in the basin in which streamflow regulation has been recommended to alleviate a pollution problem. These are discussed below.

Laurel Area, Leaf River Sub-basin

Organic and bacterial pollution degrade Tallahala Creek below Laurel to the degree that it is unfit for any use other than the transport of wastes. Nuisance conditions exist and the stream is

aesthetically undesirable in appearance. It has been recommended to the Corps of Engineers that storage in the amount of 13,650 acre-feet per year be provided in a multipurpose impoundment proposed for a site on the creek above Laurel. Based on the least cost alternative for the solution of the problem, a single-purpose reservoir on the Upper Tallahala for water quality control, the present annual value of benefits for this storage is $233,000. Because of the immediate need for streamflow regulation, this benefit was not discounted. A full discussion of water quality control needs for the Tallahala watershed is covered by a report previously submitted to the U. S. Corps of Engineers (13).

Meridian Area, Chickasawhay River Sub-basin

A U. S. Army Corps of Engineers multipurpose reservoir is now under construction on Okatibbee Creek above Meridian. This reservoir will provide 21,300 acre-feet per year of storage for stream flow regulation for water quality control as recommended in a report submitted to the Corps of Engineers in 1964 by the Department of Health, Education, and Welfare (18). The annual benefit of this storage, estimated by the least cost alternative method, is $98,700. Okatibbee Creek below Meridian is now incapable of assimilating the present pollutional load during low flow periods. Among the benefits will be the return of the stream to a condition which will allow recreation and the propagation of fish life.

Pascagoula Area, Pascagoula-Escatawpa Estuary and Pascagoula Bay

The effect of pollution in the Pascagoula-Escatawpa Estuary has been described in previous sections. The Escatawpa River portion of the estuary is unfit for aquatic life for a large part of the year. The Pascagoula River is degraded in the summer months. The oyster reefs in the bay are closed to harvesting because of the poor sanitary conditions. Recreation is limited in these waters due to nuisance conditions in the Escatawpa and bacterial contamination of the rivers and the bay.

The marine commercial fisheries of Mississippi depend on estuarine environments. Fishery biologists of the Mississippi State Marine Conservation Commission and the Gulf Coast Marine Laboratory estimate that possibly one-fourth of the commercial fish catch on the Mississippi Gulf Coast spend a portion of their life cycle in the Pascagoula Estuary. This total Mississippi Gulf Coast catch was estimated to have a dockside value of about $8,000,000 in 1964 (19). The Escatawpa River portion of the estuary, which constitutes about one quarter of the whole brackish water area, contributes little to this resource at present. It is estimated that returning this area to an environment suitable for fish and other aquatic life could increase the dockside value of the Mississippi coastal fisheries by $500,000 per year. The value of this additional catch after processing and marketing would be about $1,500,000.

The proposed U. S. Army Corps of Engineers multipurpose impoundment on the Escatawpa River at Harleston can furnish a limited amount of storage which can be used for stream flow regulation. The flow which can be maintained from this storage, together with adequate treatment of all waste now entering the Escatawpa Estuary, can return that area to a condition suitable for fish and aquatic life. The available storage, however, is sufficient only to allow the present waste load after treatment to be discharged to the Escatawpa. Future waste loads originating in the area will require disposition elsewhere.

To evaluate the benefit to be derived from storage for water quality control in the Harleston reservoir, two methods of providing for the present load after treatment have been considered as alternatives. They are as follows:

1. A single-purpose impoundment designed for water quality control by streamflow regulation at Harleston. Releases would be able to sustain the flow necessary to maintain suitable water quality in the Escatawpa Estuary with present waste loads after treatment. The cost of this alternate is $1,200,000 per year.

2. An interceptor for all wastes now entering the Escatawpa, a plant providing primary treatment of these wastes, and an ocean outfall. The cost of this alternate less the treatment differential between alternates 1 and 2 is $923,000 per year which is the "benefit" for water quality control storage to be provided by the multipurpose project.

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Appendix I
MUNICIPAL WATER SUPPLY SYSTEMS
Pascagoula River Basin
State of Mississippi
1965

Municipality 1/	County	Population 1960	Estimated Population Served	Source of Supply	Current Capacity 2/ (mgd)	Average Demand 2/ (mgd)
			Leaf River Sub-basin			
Bay Springs	Jasper	1,554	1,540	4 wells	3/	0.092 (E)
Beaumont	Perry	926	926	1 well	0.25	0.056 (E)
Calhoun Water Assn.	Jones	3/	285	1 well	3/	0.017 (E)
Camp Shelby (Miss. National Guard)	Forrest	3/	200 (8 mos. of yr.) 3,000 (4 mos. of yr.)	7 wells	3/	0.013 (E) 8 months 0.30 (E) 4 months
Central Utility Co.	Jones	3/	275	1 well	0.216 (E)	0.017 (E)
Collins	Covington	1,537	1,535	2 wells	1.48	0.25
Ellisville	Jones	4,592	4,590	3 wells	1.872	0.26
Ellisville State School	Jones	3/	2,000	2 wells	3/	0.40 (E)
Glade Water Works Assn.	Jones	3/	347	1 well	0.144	0.021 (E)

Appendix I (Cont.)

Municipality 1/	County	Population 1960	Estimated Population Served	Source of Supply	Current Capacity 2/ (mgd)	Average Demand 2/ (mgd)
		Leaf River Sub-basin (Cont.)				
Hattiesburg	Forrest	34,989	34,990	11 wells	10.0	6.0
Heidelberg	Jasper	1,049	1,050	2 wells	3/	0.063 (E)
Heidelberg 4/		3/	75	1 or more wells	3/	0.005 (E)
Laurel	Jones	27,889	27,890	10 wells	8.0	5.50
Laurel 4/		3/	572	3 wells	3/	0.034 (E)
Louin	Jasper	389	390	1 or more wells	0.18	0.023 (E)
Magee	Simpson	2,039	2,040	well & spring	0.90	0.204 (E)
M&M Water Co.	Jones	3/	295	1 or more wells	3/	0.018 (E)
Miss. State T.B. Sanatorium	Simpson	3/	710	2 wells	0.68	0.55
Mize	Smith	371	370	1 well	0.25	0.022 (E)
Mount Olive	Covington	841	840	2 wells	0.19	0.05 (E)
New Augusta	Perry	275	300	3 wells	0.17	0.018 (E)

Appendix I (Cont.)

Municipality 1/	County	Population 1960	Estimated Population Served	Source of Supply	Current Capacity 2/ (mgd)	Average Demand 2/ (mgd)
		Leaf River Sub-basin (Cont.)				
Palmers Crossing Utility Assn.	Forrest	3/	320	2 wells	0.432 (E)	0.019 (E)
Petal	Forrest	4,007	7,000	2 wells	1.80	0.50
Powers Water Assn., Inc.	Jones	3/	246	1 well	0.144 (E)	0.015 (E)
Rawls Springs Utility Assn.	Forrest	3/	155	1 well	0.216 (E)	0.009 (E)
Raleigh	Smith	614	825	2 wells	0.70	0.05 (E)
Richton	Perry	1,089	1,200	2 wells	0.50	0.072 (E)
Sandersville	Jones	657	655	1 or more wells	0.18	0.039 (E)
Seminary	Covington	288	390	1 or more wells	0.50	0.023 (E)
Shady Grove Water Works	Jones	3/	253	1 well	0.144 (E)	0.015 (E)
Sharon Water Assn.	Jones	3/	219	1 well	0.288 (E)	0.013 (E)

Appendix I (Cont.)

Municipality 1/	County	Population 1960	Estimated Population Served	Source of Supply	Current Capacity 2/ (mgd)	Average Demand 2/ (mgd)
			Leaf River Sub-basin (Cont.)			
Soso Community Water System, Inc.	Jones	3/	115	1 well	0.144 (E)	0.007 (E)
Stringer Water Works Assn.	Jasper	3/	136	1 well	0.288 (E)	0.008 (E)
Sumrall	Lamar	797	980	1 well	3/	0.059 (E)
Taylorsville	Smith	1,132	1,130	3 wells	0.50	0.068 (E)
U.S. Air Force Detachment (Near Ellisville)	Jones	3/	100	1 or more wells	3/	0.006 (E)
			Chickasawhay River Sub-basin			
Buckatunna Water Assn., Inc.	Wayne	3/	40	1 or more wells	3/	0.002 (E)
Clarkdale Water Assn., Inc.	Clarke and Lauderdale	3/	296	3 wells	3/	0.018 (E)
Clara Water Assn., Inc.	Wayne	3/	160	2 wells	3/	0.01 (E)
Collinsville Water Assn., Inc.	Lauderdale	3/	82	1 well	3/	0.005 (E)

Appendix I (Cont.)

Municipality 1/	County	Population 1960	Estimated Population Served	Source of Supply	Current Capacity 2/ (mgd)	Average Demand 2/ (mgd)
			Chickasawhay River Sub-basin (Cont.)			
Decatur	Newton	1,340	1,400	2 wells	0.233	0.084 (E)
Hickory	Newton	539	575	2 wells	0.10	0.035 (E)
Leaksville	Greene	1,014	1,015	3 wells	0.53	0.061 (E)
Long Creek Water Assn., Inc.	Lauderdale	3/	139	1 or more wells	3/	0.008 (E)
Meridian	Lauderdale	49,374	50,000	4 wells & 2 reservoirs	8.0	6.0
Meridian 4/		3/	817	1 or more wells	3/	0.082 (E)
Newton	Newton	3,178	3,250	2 wells	1.10	0.325 (E)
Pachuta	Clarke	271	400	1 or more wells	0.20	0.024 (E)
Quitman	Clarke	2,030	2,450	2 wells	1.37	0.245 (E)
Shubuta	Clarke	718	730	2 wells	0.29	0.044 (E)
State Line	Greene & Wayne	653	400	1 well	0.108	0.024 (E)

Appendix I (Cont.)

Municipality 1/	County	Population 1960	Estimated Population Served	Source of Supply	Current Capacity 2/ (mgd)	Average Demand 2/ (mgd)
		Chickasawhay River Sub-basin (Cont.)				
Stonewall	Clarke	1,126	1,200	2 wells	0.10	0.072 (E)
Union	Neshoba & Newton	1,726	1,850	2 wells	0.83	0.111 (E)
Union 4/		3/	51	2 wells	3/	0.003 (E)
Waynesboro	Wayne	3,892	3,900	3 wells	1.74	0.30
		Lower Pascagoula Sub-basin				
Brooklyn Utility Assn.	Forrest	3/	139	1 well	0.216 (E)	0.008 (E)
Lucedale	George	1,977	1,980	2 wells	1.40	0.198 (E)
Jackson Co. Ind. Water Supply System	Jackson	None	None	Pascagoula River	15.0	7.23
Jackson Co. Utilities, Bayou Casotte	Jackson	3/	2,600	3 wells	4.32	0.26 (E)
Jackson Co. Utilities, Escatawpa	Jackson	3/	1,800	3 wells	2.16	0.108 (E)
Lumberton	Lamar	2,108	2,360	2 wells	3/	0.236 (E)

Appendix I (Cont.)

Municipality 1/	County	Population 1960	Estimated Population Served	Source of Supply	Current Capacity 2/ (mgd)	Average Demand 2/ (mgd)
			Lower Pascagoula Sub-basin (Cont.)			
Moss Point	Jackson	6,631	15,000	5 wells	4.10	2.2
Moss Point		3/	154	1 well	3/	0.009 (E)
North Lamar Water Co.	Lamar	3/	137	1 well	3/	0.008 (E)
Pascagoula	Jackson	17,155	20,000	8 wells	6.34	2.0 (E)
Perkinston Jr. College	Stone	3/	569	2 wells	0.30	0.069 (E)
Purvis	Lamar	1,614	1,690	2 wells	3/	0.101 (E)
Purvis		3/	778	2 or more wells	3/	0.057 (E)
Wiggins	Stone	1,591	2,500	2 wells	1.00	0.25 (E)
Citronelle, Ala.	Mobile	1,918	2,620	1 or more wells	1.728	1.3
Fruitdale, Ala., Water System	Washington	3/	225	1 or more wells	0.144 (E)	0.014 (E)
Grand Bay, Ala., Water System	Mobile	3/	1,870	1 or more wells	0.576	0.07
Mobile, Ala.	Mobile	202,779	205,000	Big Creek Reservoir	40.0	33.5

Appendix I (Cont.)

1/ The term municipality here includes systems owned and operated by governmental entities, private utility bodies serving the public, and other suppliers of water for domestic use. All municipalities listed are in the state of Mississippi, unless otherwise noted.

2/ Entries followed by (E) are estimated.

3/ Information not available.

4/ Denotes urban fringe area served by private systems as distinguished from the system of the incorporated area.

Appendix II
MAJOR INDUSTRIAL WATER USERS
Pascagoula River Basin
1965

Location [1]	Type of Industry	Source of Water Supply	Estimated Average Demand (mgd)
		Leaf River Sub-basin	
Bay Springs	Poultry processing	City of Bay Springs	0.10
Collins	Poultry processing	Private well	0.4
Hattiesburg	Poultry processing	Private well	0.16
	Naval stores and derivatives	City of Hattiesburg, Bowie River and private well	11
	Power production	Leaf River	75
	Naval stores [2]	Private well	2.8
	Meat processing and packing	Private well	0.14
Laurel	Poultry processing	City of Laurel	0.3
	Wood products	21 private wells	7.3
Sandersville	Petroleum refining	Private well	0.8
		Chickasawhay River Sub-basin	
Meridian	Roofing materials	3 private wells	0.16
	Wood fiber products	City of Meridian and private well	1.5
	Wood furniture mfg.	City of Meridian and private well	0.19

Appendix II (Cont.)

Location 1/	Type of Industry	Source of Water Supply	Estimated Average Demand (mgd)
		Lower Pascagoula Sub-basin	
Bayou Casotte	Fertilizers, acids	Jackson Co. Industrial Water Supply (Pascagoula River) and private wells	6.8
	Basic refractories	Bayou Casotte 3/ and 3 private wells	250.75
	Petroleum refining	Jackson Co. Industrial Water Supply (Pascagoula River) and 2 private wells	4.5
Moss Point	Bleached kraft paper	City of Moss Point, Franklin Creek, Escatawpa River and private wells	45
	Fish reduction	Private wells	0.36
	Synthetic rubber	Private wells	1.2
Pascagoula	Canned pet food	City of Pascagoula and 2 private wells	0.35
Purvis	Petroleum refining	3 private wells	2.3
Wiggins	Pickle mfg.	City of Wiggins and private wells	0.1

1/ All locations are in the State of Mississippi.

2/ Has ceased operation since survey was made.

3/ This industry uses 250 mgd of salt water from Mississippi Sound via Bayou Casotte for source of raw material (magnesium salts).

Appendix III
PROJECTED MUNICIPAL AND INDUSTRIAL WATER SUPPLY
REQUIREMENTS FOR SELECTED LOCATIONS
Pascagoula River Basin

County 1/	Location	Projected 2015 Population	Projected 2015 Requirements Munic. (mgd)	Indust. (mgd)	Expected Source	Quantity of Available Ground water (mgd)	Future Surface Supply Requirement (mgd)
			Leaf River Sub-basin				
Covington	Collins	5,000	0.8	0.4	Ground	5	None
Forrest	Hattiesburg Area	76,800	11.5	12.5	Ground	50	None
		---	---	88	Surface	--	88
	McCallum (Possible Paper Mill) 2/	---	---	72	Surface	30	72
Jasper	Bay Springs	6,300	0.9	Nil	Ground	10	None
Jefferson Davis	3/	---	---	---	---	5	---
Jones	4/	108,000 5/	16.0 5/	29.0 5/	Surface	--	Reservoir Proposed
Lamar	Purvis	4,000	0.6	Nil	Ground	25	None
	Possible expansion of oil refining	---	---	4.5	---	25	None
Perry	Beaumont	1,800	0.3	Nil	Ground	30	None
Scott	3/	---	---	---	---	25	---

Appendix III (Cont.)

County 1/	Location	Projected 2015 Population	Projected 2015 Requirements Munic. (mgd)	Indust. (mgd)	Expected Source	Quantity of Available Ground water (mgd)	Future Surface Supply Requirement (mgd)
			Leaf River Sub-basin (Cont.)				
Simpson	Magee	3,600	0.5	Nil	Ground	10	None
Smith	Taylorsville	2,200	0.3	Nil	Ground	10	None
			Chickasawhay River Sub-basin				
Clarke	Quitman	3,400	0.5	Nil	Ground	10	None
	Possible paper mill (in county)	---	---	25	Ground and Surface	10	15
Greene	Leakesville	1,200	0.2	Nil	Ground	25 6/	None
	Possible paper mill (in county)	---	---	25	Surface	25	25
Kemper	3/	---	---	---	---	10	---
Lauderdale	Meridian	104,900 7/	15.7 7/	9.2 7/	Surface	--	Reservoir under construction
Neshoba	3/	---	---	---	---	20	---
Newton	Newton	8,200	1.2	Nil	Ground	20	None

Appendix III (Cont.)

County 1/	Location	Projected 2015 Population	Projected 2015 Requirements Munic. (mgd)	Indust. (mgd)	Expected Source	Quantity of Available Ground water (mgd)	Future Surface Supply Requirement (mgd)
			Chickasawhay River Sub-basin (Cont.)				
Wayne	Waynesboro	12,000	1.8	Nil	Ground	20	None
			Lower Pascagoula Sub-basin				
George	Lucedale	5,800	0.9	Nil	Ground	10	None
Jackson	8/	258,000	---	5	Ground	20 9/	None
		---	39	300	Surface	--	339
Stone	Wiggins	3,900	0.6	Nil	Ground	50	None
	Possible paper mill	---	---	25	Ground	50	None

1/ All counties are in the State of Mississippi.

2/ 600 ton initial capacity - 1,200 ton future capacity.

3/ No town of appreciable size in basin.

4/ Includes Ellisville, Laurel, Sandersville, and other concentrations of population in Jones County.

5/ Data based on "Municipal and Industrial Water Supply and Water Quality Control Study, Tallahala Creek Watershed, Jones County, Mississippi", December, 1965 - USPHS.

Appendix III (Cont.)

6/ Probable iron problem in ground water.

7/ Data based on "Municipal and Industrial Water Supply Storage Requirements, Okatibbee Creek Reservoir, Meridian, Mississippi", April, 1961 - USPHS.

8/ Includes Pascagoula, Escatawpa, Moss Point, Eastside, Kreole and Bayou Casotte.

9/ Future use of ground water may be affected by salt water intrusion.

APPENDIX IV
MUNICIPAL WASTE DISCHARGES
Pascagoula River Basin
1965

Municipality 1/	Population 1960 Census	Estimated Population Served	Estimated Average Flow (mgd)	Type Treatment	Design Capacity P.E. 2/	Design Capacity Flow 3/ (mgd)	Estimated P.E. 2/ Untreated Waste	Estimated P.E. 2/ Discharged Waste	Receiving Stream
				Leaf River Sub-basin					
Bay Springs	1,544	500	0.05	Lagoon	1,500	0.150	500	50	Etehoma Creek to Big Creek
		300	0.13	Lagoon	9,000	0.900	1,660 4/	83	Etehoma Creek to Big Creek
Beaumont	926	926	0.09	Lagoon	1,710	0.170	926	93	Carter Creek to Leaf River
Camp Shelby (Mississippi National Guard)		200-8 mo. 3,000-4 mo.	5/	Activated sludge	5/	5/	3,000	300	Weldy Creek to Leaf River
Collins	1,537	1,600	0.16	None	-	-	1,600	1,600	Okatoma Creek
Ellisville	4,592	1,050	0.11	Septic tank	5/	5/	1,050	1,050	Rocky Creek to Tallahala Creek
		1,000	0.10	Lagoon	990	0.099	1,000	100	Rocky Creek to Tallahala Creek
		1,500	0.15	None	-	-	1,500	1,500	Tallahala Creek
Jones County Junior College	-	1,700	0.17	None	-	-	1,000	1,000	Rocky Creek to Tallahala Creek

APPENDIX IV (CONT.)

Municipality 1/	Population 1960 Census	Estimated Population Served	Estimated Average Flow (mgd)	Type Treatment	Design Capacity P.E. 2/	Design Capacity Flow 3/ (mgd)	Estimated P.E. 2/ Untreated Waste	Estimated P.E. 2/ Discharged Waste	Receiving Stream
Leaf River Sub-basin (Cont.)									
Ellisville State School	-	2,000	0.40	Lagoon	3,600	0.360	2,000	200	Rocky Creek to Tallahala Creek
Hattiesburg	34,989	46,800	11.6	None	-	-	61,000 4/	61,000 *	Leaf River
Heidelberg	1,049	640	0.06	Imhoff tank	750	0.075	640	480	Beaver Creek to Bogue Homo Creek
		300	0.03	Lagoon	300	0.030	300	30	Beaver Creek to Bogue Homo Creek
Laurel	27,889	1,000	0.10	Lagoon	1,500	5/	1,000	100	Tallahala Creek
		12,000	1.40	Lagoon	24,600	24.600	17,900 4/	2,688	Tallahala Creek
		800	0.11	None	-	-	1,280 4/	1,280	Tallahala Creek
		12,000	1.20	None	-	-	12,000	12,000 *	Tallahala Creek
		2,000	0.20	Lagoon	3,600	0.36	2,000	200	Tallahoma Creek
		5/	5/	Lagoon	300	0.900	5/	5/	Tallahala Creek
Magee	2,039	1,000	0.10	Septic tanks	-	-	1,085 4/	1,085	Creeks to Okatoma Creek

* Since the FWPCA Survey of 1965 these wastes have been provided with treatment by lagoons.

APPENDIX IV (CONT.)

Municipality 1/	Population 1960 Census	Estimated Population Served	Estimated Average Flow (mgd)	Type Treatment	Design Capacity P.E. 2/	Design Capacity Flow 3/ (mgd)	Estimated P.E. 2/ Untreated Waste	Estimated P.E. 2/ Discharged Waste	Receiving Stream
				Leaf River Sub-basin (Cont.)					
Magee (Cont.)		1,300	0.13	None	-	-	1,300	1,300	Goodwater Creek to Okatoma Creek
Mississippi State T.B. Sanatorium (Sanatorium)	-	710	5/	Imhoff tank	1,000	0.10	710	533	Creek to Okatoma Creek
Mount Olive	841	840	0.08	Lagoon	1,500	0.150	840	84	Okatoma Creek
New Augusta	275	200	5/	Imhoff tank	900	0.090	200	200 6/	Leaf River via Swamp
Petal	4,007	4,005	0.40	Lagoon	7,500	0.750	4,530 4/	453	Leaf River
Richton	1,089	1,100	0.11	None	-	-	1,100	1,100	Thompson Creek
Seminary	288	360	0.03	Lagoon	900	0.090	360	36	Okatoma Creek
Taylorsville	1,132	1,000	0.12	Lagoon	1,800	0.180	1,000	100	Fisher Creek to Leaf River
U.S. Air Force Detachment (near Ellisville)	-	100	0.01	Septic tank	5/	5/	100	100	Drainage to tributary of Leaf River

APPENDIX IV (CONT.)

Municipality 1/	Population 1960 Census	Estimated Population Served	Estimated Average Flow (mgd)	Type Treatment	Design Capacity P.E. 2/	Design Capacity Flow 3/ (mgd)	Estimated P.E. 2/ Untreated Waste	Estimated P.E. 2/ Discharged Waste	Receiving Stream
				Chickasawhay River Sub-basin					
Decatur	1,340	780	0.08	Lagoon	1,350	0.135	780	78	Oakahatta Canal to Chunky River
		520	0.05	Lagoon	900	0.090	520	52	Branch to Oakahatta Canal to Chunky River
Hickory	539	500	0.05	None	-	-	500	500	Potterchitto Creek to Chunky River
Leakesville	1,014	1,014	0.10	Lagoon	1,500	0.150	1,014	101	Chickasawhay River
Meridian	49,374	46,640	4.0	Activated sludge	60,000	6.000	46,640 4/	4,664	Sowashee Creek to Okatibbee Creek
St. Joseph's Hospital	-	1,500	5/	Lagoon	1,500	5/	1,500	150	Branch to Sowashee Creek
Newton	3,178	2,600	0.26	Lagoon	4,500	0.450	2,860 4/	286	Potterchitto Creek to Chunky River
		500	0.05	Lagoon	900	0.090	500	50	Branch to Potterchitto Creek to Chunky River

APPENDIX IV (CONT.)

Municipality 1/	Population 1960 Census	Estimated Population Served	Estimated Average Flow (mgd)	Type Treatment	Design Capacity P.E. 2/	Design Capacity Flow 3/ (mgd)	Estimated P.E. 2/ Untreated Waste	Estimated P.E. 2/ Discharged Waste	Receiving Stream
Chickasawhay River Sub-basin (Cont.)									
Quitman	2,030	1,900	0.19	None	-	-	1,900	1,900	Chickasawhay River
Stonewall (Erwin Mills, Inc. 7/)	1,126	800	0.08	Imhoff tank mechanical-ly cleaned	1,000	0.106	1,180 4/	755	Bostic Creek to Chickasawhay River
Union	1,726	1,600	0.16	Septic tank	5/	5/	1,600	1,600	Chunky Creek
Waynesboro	3,892	3,892	0.40	Lagoon	6,900	0.690(E)	3,892	389	Jones Branch to Chickasawhay River
Lower Pascagoula Sub-basin									
Bayou Casotte	-	8,000	0.10	Activated sludge	16,000	1.600	8,000	800	Bayou Casotte
Citronelle, Alabama	1,918	1,000	0.10	Imhoff tank	270	0.027	1,000	890	Puppy Creek to Escatawpa River
Escatawpa	1,464	4,000	0.30	Activated sludge	8,600	0.860	4,000	400	Escatawpa River
Lucedale	1,977	1,975	0.20	Imhoff tank	1,200	0.120	2,035 4/	2,035 6/	Big Creek

APPENDIX IV (CONT.)

Municipality 1/	Population 1960 Census	Estimated Population Served	Estimated Average Flow (mgd)	Type Treatment	Design Capacity P.E. 2/	Design Capacity Flow 3/ (mgd)	Estimated P.E. 2/ Untreated Waste	Estimated P.E. 2/ Discharged Waste	Receiving Stream
			Lower Pascagoula Sub-basin (Cont.)						
Lumberton	2,108	1,000	0.10	Lagoon	1,410	0.141	1,000	100	Branch to Red Creek
		1,000	0.10	Lagoon	1,350	0.135	1,000	100	Red Creek
Moss Point	6,631	7,200	0.71	Trickling filters	5,625	0.710	7,200	3,600	Pascagoula River
Pascagoula	17,155	27,000	2.70	Activated sludge	35,000	3.500	27,000 4/	3,443	Pascagoula River
Perkinston Junior College (Perkinston)	-	569	0.06	Septic tank	5/	5/	569	569	Ten Mile Creek to Red Creek
Purvis	1,614	530	0.05	Lagoon	600	0.060	530	53	Meyers Creek to Black Creek
		1,085	0.11	Lagoon	1,800	0.180	1,085	109	Sugar Creek to Meyers Creek to Black Creek
Wiggins	1,591	1,000	0.10	Lagoon	1,950	0.195	1,000	100	Branch to Red Creek
		500	0.05	Lagoon	1,050	0.105	500	50	Branch to Red Creek

APPENDIX IV (CONT.)

1/ The term municipality includes systems owned and operated by governmental entities, public and private institutions, etc., discharging either domestic wastes or a combination of domestic and industrial wastes. All municipalities are in the State of Mississippi unless otherwise noted.

2/ Population equivalents.

3/ Entries followed by (E) are estimated.

4/ Combination of industrial and municipal wastes.

5/ Information not available.

6/ Treatment facility presently being bypassed.

7/ System owned by Erwin Mills, Inc.

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PASCAGOULA RIVER COMPREHENSIVE BASIN STUDY. VOLUME VI. APPENDIX--ETC(U)
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APPENDIX V
INDUSTRIAL WASTE DISCHARGES
Pascagoula River Basin
1965

Location 1/	Type of Industry	Type of Waste	Estimated Average Flow (mgd)	Type of Treatment	Estimated P.E. 2/ Untreated Waste	Estimated P.E. 2/ Discharged Waste	Receiving Stream
			Leaf River Sub-basin				
Bay Springs	Poultry processing	Process water	0.10	3/	---	---	---
Beaumont	Pine plywood mfg.	Wood sugars	4/	4/	4/	4/	Leaf River
	Hardwood plywood mfg.	Wood sugars	4/	Septic tank	4/	4/	Leaf River
Collins	Poultry processing	Process water	0.4	Lagoons	6,618	331	Okatoma Creek
Ellisville	Meat processing & packing	Process water	0.001	None	200	200	Branch to Rocky Cr. to Tallahala Creek
Glendale	Meat processing & packing	Process water	0.003	Septic tank	300	300	Bowie River
Hattiesburg	Poultry processing	Process water	0.16	3/	---	---	---
	Dairy products	Wash water	4/	Septic tank	305	305	Leaf River
	Naval stores and derivatives	Cooling water & chemical	10.9	None	94,000	94,000	Bowie River
	Power production	Cooling water	75	---	---	---	Leaf River
	Naval stores 5/	Chemical	2.9	None	1,428	1,428	Leaf River
	Meat processing & packing	Process water	4/	3/	---	---	---

APPENDIX V (cont.)

Location 1/	Type of Industry	Type of Waste	Estimated Average Flow (mgd)	Type of Treatment	Estimated P.E. 2/ Untreated Waste	Discharged Waste	Receiving Stream
			Leaf River sub-basin (cont.)				
Laurel	Dairy products	Wash water	0.06	Lagoon	1,250	625	Tallahoma Creek
	Meat processing	Process water	4/	3/	---	---	---
	Rendering	Press liquor	4/	*None*	4/	4/	Tallahala Creek
	Wood preserving	Creosoting wastes	4/	None	4/	4/	Possible drainage to Tallahala Cr.
	Poultry processing	Process water	4/	3/	---	---	---
	Meat processing	Process water	0.021	3/	---	---	---
	Poultry processing 6/	Process water	0.3	3/	---	---	---
	Wood products	Wood sugars	4/	Clarifier & 6 ponds	4/	7/	Tallahala Creek
Magee	Meat curing & processing	Wash water	4/	None	162	162	Mill Creek to Oakatoma Creek
	Poultry processing	Process water	4/	3/	---	---	---
Petal	Poultry processing	Process water	0.009	3/	---	---	---
	Wood processing	Creosoting wastes	4/	None	4/	4/	Possible drainage to Leaf River
	Meat processing	Process water	4/	None	620	620	Leaf River
	Meat processing	Process water	0.003	Septic tank	237	214	Branch to Leaf River
Sandersville	Petroleum refining	Condensates, brine & acids	0.8	Separation	500	500	Bogue Homo Creek to Leaf River

APPENDIX V (cont.)

Location 1/	Type of Industry	Type of Waste	Estimated Average flow (mgd)	Type of Treatment	Estimated P.E. 2/ Untreated Waste	Discharged Waste	Receiving Stream
			Chickasawhay River Sub-basin				
Meridian	Roofing materials	Chemical & fiber	0.16	None	4,780	4,780	Okatibbee Creek
	Fertilizer mfg.	Chemical	0.004	3/	---	---	---
	Meat packing	Process water	0.06	None	260	260	Sowashee Creek to Okatibbee Creek
	Wood fiber	Wood sugars & chemicals	1.5	None for ind. waste.	34,600	34,600	Sowashee Creek to Okatibbee Creek
	Wooden crates, boxes, etc.	Cooling water	0.038	3/	---	---	---
	Wood preserving	Creosoting wastes	0.02	None	2,720	2,720	Sowashee Creek to Okatibbee Creek
	Wood furniture mfg.	Cooling water	0.19	None	4/	4/	Sowashee Creek to Okatibbee Creek
	Poultry processing	Process water	0.004	3/	---	---	---
	Slaughter house	Wash water	0.100	None	500	500	Sowashee Creek to Okatibbee Creek
	Tallow mfg.	Process water	0.020	None	4/	4/	Sowashee Creek to Okatibbee Creek
Newton	Ice cream mfg.	Cooling & wash water	0.021	3/	---	---	---
	Cheese mfg.	Cooling & wash water	0.020	3/	---	---	---
Stonewall	Cotton textiles	Process water	0.11	3/	---	---	---

APPENDIX V (cont.)

Location 1/	Type of Industry	Type of Waste	Estimated Average Flow (mgd)	Type of Treatment	Estimated P.E. 2/ Untreated Waste	Discharged Waste	Receiving Stream
			Lower Pascagoula Basin				
Bayou Casotte	Fertilizer, acids	Sanitary waste, cooling water & chemicals	6.8 8/	Septic tank for sanitary wastes. None for ind. waste.	4/	4/	Bayou Casotte
	Basic refractories	Sanitary waste & process water	250.75 9/	Septic tank for sanitary wastes. None for ind. waste.	60	39	Mississippi Sound
	Petroleum refining	Refinery waste	22.5 10/	Separation, stripping, lagoons and dilution	76,000	11,000	Mississippi Sound
Gautier	Creosoted wood products	Creosoting wastes	4/	Separation	4/	4/	West Pascagoula River
Lucedale	Dairy products	Process water	0.072	11/	---	---	---
	Hardwood veneer	Soaking water	4/	Septic tank	4/	4/	Big Creek to Chickasawhay River
Lumberton	Petroleum refining	Refinery waste	4/	Separation	4/	4/	Red Creek

APPENDIX V (cont.)

Location 1/	Type of Industry	Type of Waste	Estimated Average Flow (mgd)	Type of Treatment	Estimated P.E. 2/ Untreated Waste	Estimated P.E. 2/ Discharged Waste	Receiving Stream
			Lower Pascagoula Basin (cont.)				
Moss Point	Bleached kraft paper	Paper mill wastes	45	Sedimentation	420,000	335,000	Escatawpa Estuary
	Fish reduction (3 plants)	Process water	0.36	None	175,000	175,000	Escatawpa Estuary
	Synthetic rubber	Chemical	1.2	None	113,000	113,000	Escatawpa Estuary
Pascagoula	Ship building	Sanitary waste	0.009	Septic tank	600	600	Pascagoula River
	Plywood & veneer	Wood sugars, sanitary cooling & process water.	4/	Septic tank for sanitary wastes. None for ind. waste	4/	4/	Pascagoula River
	Canned pet food	Cooling and process water	0.35	None	4/	4/	Pascagoula River
Purvis	Petroleum refining	Refinery waste	2.30	Separation, skimming & lagoon	12,000	1,800	Black Creek
Wiggins	Pickle mfg.	Brine and process water	0.10	None	12,300	12,300	Flint Creek to Red Creek
	Naval stores	Cooling water & chemical	4/	None	4/	4/	Branch to Red Creek
	Wood preserving	Creosoting wastes	4/	None	4/	4/	Possible drainage to water course to Red Creek

APPENDIX V (cont.)

1/ All locations are in the State of Mississippi.

2/ Population equivalent.

3/ Receives treatment in municipal waste treatment plant - industrial waste load is reflected in figures for municipal loads.

4/ Data unavailable.

5/ Has ceased operation since survey was made.

6/ Not yet in operation at time of survey.

7/ Calculated from stream data to range from 120,000 to 12,000,000 P.E. per day.

8/ This industry uses 3.6 mgd of salt water from Mississippi Sound via Bayou Casotte for cooling purposes.

9/ This industry uses 250 mgd of salt water from Mississippi Sound via Bayou Casotte for source of raw material (magnesium salts).

10/ This industry uses 18 mgd of salt water from Mississippi Sound for the dilution of its wastes.

11/ Discharges to a municipal system which does not provide treatment - industrial waste load is reflected in figures for municipal load.

Appendix VI

DESCRIPTION OF SAMPLING STATIONS 1/
PASCAGOULA RIVER BASIN

Station 010050 - Escatawpa River, sec. 19, T. 2 S., R. 4 W., in Mobile County, Alabama, at bridge on U. S. Highway 98, near Wilmer, Alabama.

Station 273301 - Pascagoula Bay, lat. 30°20'33" N., long. 88°34'20" W.

Station 273302 - Pascagoula Bay, lat. 30°20'33" N., long. 88°35'12" W.

Station 273303 - Pascagoula Bay, lat. 30°20'42" N., long. 88°36'04" W.

Station 273304 - Pascagoula Bay, lat. 30°21'46" N., long. 88°36'13" W.

Station 273305 - Pascagoula Bay, lat. 30°20'58" N., long. 88°36'58" W.

Station 273306 - Pascagoula Bay, lat. 30°21'24" N., long. 88°37'49" W.

Station 273307 - Pascagoula Bay, lat. 30°20'57" N., long. 88°40'02" W.

Station 273308 - Pascagoula Bay, lat. 30°20'43" N., long. 88°40'42" W.

Station 273309 - Pascagoula Bay, lat. 30°20'28" N., long. 88°41'22" W.

Station 273310 - Pascagoula Bay, lat. 30°20'07" N., long. 88°39'43" W.

Station 273311 - Pascagoula Bay, lat. 30°20'26" N., long. 88°38'30" W.

Station 273312 - Pascagoula Bay, lat. 30°19'46" N., long. 88°35'50" W.

Station 273313 - Pascagoula Bay, lat. 30°19'18" N., long. 88°34'13" W.

Station 273314 - Pascagoula Bay, lat. 30°20'25" N., long. 88°33'57" W.

Station 273315 - Pascagoula Bay, lat. 30°20'12" N., long. 88°32'40" W.

Station 273316 - Pascagoula Bay, lat. 30°19'56" N., long. 88°31'33" W.

Station 273317 - Pascagoula Bay, lat. 30°19'27" N., long. 88°30'46" W.

Station 273318 - Pascagoula Bay, lat. 30°20'12" N., long. 88°30'37" W.

Station 273319 - Pascagoula Bay, lat. 30°18'48" N., long. 88°29'48" W.

Station 273320 - Pascagoula Bay, lat. 30°17'52" N., long. 88°30'03" W.

Station 273321 - Pascagoula Bay, lat. 30°18'27" N., long. 88°31'06" W.

Station 273322 - Pascagoula Bay, lat. 30°19'03" N., long. 88°31'47" W.

Appendix VI (cont.)

Station 273420 - West Pascagoula River, sec. 9, T. 8 S., R. 6 W., in Jackson County, at bridge on U. S. Highway 90, near Gautier.

Station 273440 - West Pascagoula River, sec. 7, T. 7 S., R. 6 W., in Jackson County, 1.7 miles downstream of point where the Pascagoula River divides into the Pascagoula and West Pascagoula Rivers, at Singing River Camp, river mile 7.40 from mouth of West Pascagoula River.

Station 273500 - Pascagoula Bay, lat. 30°19'23" N., long. 88°32'53" W. in ship channel.

Station 273501 - Pascagoula River, sec. 6, T. 8 S., R. 6 W., in Jackson County, at mouth of river, river mile 0.0, lat. 30°20'35" N., long. 88° 34'02" W.

Station 273570 - Pascagoula River, sec. 7, T. 8 S., R. 6 W., in Jackson County, at bridge on U. S. Highway 90.

Station 273580 - Pascagoula River, in Jackson County, at river mile 4.7, west of Moss Point, lat. 30°24'02" N., long. 88°34'53" W.

Station 273590 - Pascagoula River, sec. 10, T. 7 S., R. 6 W., in Jackson County, at river mile 5.7, at left hand third point facing upstream, below mouth of Escatawpa River, lat. 30°25'18" N., long. 88°33'50" W.

Station 273591 - Pascagoula River, sec. 10, T. 7 S., R. 6 W., in Jackson County, at river mile 5.7, at right hand third point facing upstream, below mouth of Escatawpa River, lat. 30°25'18" N., long. 88°33'50" W.

Station 273605 - Escatawpa River, sec. 24, T. 7 S., R. 6 W., in Jackson County, at bridge on Mississippi State Highway 63, near Moss Point.

Station 273610 - Escatawpa River, sec. 19, T. 7 S., R. 5 W., in Jackson County, at Mississippi Export Railroad bridge, near Moss Point.

Station 273620 - Escatawpa River, sec. 21, T. 7 S., R. 5 W., in Jackson County, at river mile 5.60 from the mouth of Escatawpa River.

Station 273625 - Escatawpa River, sec. 16, T. 7 S., R. 5 W., in Jackson County, at river mile 7.20 from the mouth of Escatawpa River.

Station 273630 - Escatawpa River, sec. 15, T. 7 S., R. 5 W., in Jackson County, at river mile 9.40 from the mouth of Escatawpa River, near Orange Grove.

Station 273635 - Escatawpa River, sec. 36, T. 6 S., R. 5 W., in Jackson County, at river mile 12.70 from the mouth of Escatawpa River, below Goodes Mill Lake.

Appendix VI (cont.)

Station 273640 - Escatawpa River, sec. 36, T. 6 S., R. 5 W., in Jackson County, at river mile 14.50 from the mouth of Escatawpa River, immediately below Goodes Mill Lake.

Station 273665 - Escatawpa River, sec. 12, T. 5 S., R. 5 W., in Jackson County, at bridge on county road, southeast of Hurley.

Station 273670 - Escatawpa River, sec. 2, T. 4 S., R. 5 W., in Jackson County, at bridge on county road, east of Harleston.

Station 273710 - Pascagoula River, sec. 11, T. 7 S., R. 6 W., in Jackson County, at river mile 10.0 from the mouth of the Pascagoula River, near mouth of Brickyard Bayou.

Station 273745 - Pascagoula River, sec. 27, T. 5 S., R. 6 W., in Jackson County, at river mile 26.30 from the mouth of the Pascagoula River, near Cumbest Bluff.

Station 273760 - Red Creek, sec. 3, T. 4 S., R. 8 W., in Jackson County, at bridge on county road, near Vestry.

Station 273765 - Red Creek, sec. 20, T. 3 S., R. 9 W., in Stone County, at bridge on Mississippi State Highway 15.

Station 273770 - Red Creek, sec. 23, T. 3 S., R. 11 W., in Stone County, at bridge on county road, southeast of Wiggins.

Station 273775 - Red Creek, sec. 7, T. 3 S., R. 11 W., in Stone County, at bridge on U. S. Highway 49, south of Wiggins.

Station 273780 - Red Creek, sec. 20, T. 2 S., R. 12 W., in Stone County, at bridge on Mississippi State Highway 26, west of Wiggins.

Station 273785 - Red Creek, sec. 5, T. 1 S., R. 14 W., in Pearl River County, at bridge on Interstate Highway 59, near Lumberton.

Station 273800 - Black Creek, sec. 14, T. 3 S., R. 8 W., in George County, at bridge on Mississippi State Highway 57.

Station 273810 - Black Creek, sec. 20, T. 2 S., R. 9 W., in Stone County, at bridge on Mississippi State Highway 26, east of Wiggins.

Station 273820 - Black Creek, sec. 1, T. 1 S., R. 11 W., in Perry County, at bridge on Mississippi State Highway 29.

Station 273830 - Black Creek, sec. 15, T. 1 N., R. 12 W., in Forrest County, at bridge on Old U. S. Highway 49, near Brooklyn.

Station 273835 - Little Black Creek, sec. 28, T. 2 N., R. 13 W., in Forrest County, at bridge on county road north of Rock Hill.

Appendix VI (cont.)

Station 273840 - Black Creek, sec. 26, T. 3 N., R. 14 W., in Lamar County, at bridge on U. S. Highway 11, northeast of Purvis.

Station 273843 - Black Creek, sec. 1, T. 3 N., R. 15 W., in Lamar County, at bridge on Mississippi State Highway 589, northwest of Purvis.

Station 273850 - Pascagoula River, sec. 24, T. 4 S., R. 7 W., in Jackson County, near end of county road, at river mile 44.0 from the mouth of the Pascagoula River.

Station 273865 - Pascagoula River, sec. 22, T. 3 S., R. 7 W., in George County, at river mile 53.0 from the mouth of the Pascagoula River, at Gibson Landing.

Station 273870 - Pascagoula River, sec. 1, T. 3 S., R. 8 W., in George County, at river mile 62.0 from the mouth of the Pascagoula River, at Wilkerson Ferry.

Station 273880 - Pascagoula River, sec. 15-22 line, T. 2 S., R. 8 W., in George County, at bridge on Mississippi State Highway 26.

Station 273895 - Pascagoula River, sec. 18-19 line, T. 1 S., R. 7 W., in George County, at bridge on county road, at Merrill.

Station 273910 - Chickasawhay River, sec. 29, T. 1 N., R. 7 W., in Greene County, at bridge on U. S. Highway 98, near Lucedale.

Station 273920 - Big Creek, sec. 1, T. 1 N., R. 7 W., in Greene County, at bridge on county road, southwest of Leakesville.

Station 273940 - Chickasawhay River, sec. 2-3 line, T. 1 N., R. 6 W., in Greene County, at river mile 21.90 from the mouth of Chickasawhay River, near Leakesville.

Station 273950 - Chickasawhay River, sec. 12, T. 2 N., R. 6 W., in Greene County, at bridge on Mississippi State Highway 63, near Leakesville.

Station 273980 - Chickasawhay River, sec. 26, T. 5 N., R. 6 W., in Greene County, at bridge on county road, near Knobtown.

Station 273985 - Big Creek, sec. 22, T. 6 N., R. 6 W., in Wayne County, at bridge on county road, northwest of State Line.

Station 274010 - Bucatunna Creek, sec. 5, T. 6 N., R. 5 W., in Wayne County, at bridge on U. S. Highway 84, near Buckatunna.

Appendix VI (cont.)

Station 274105 - Chickasawhay River, sec. 23, T. 7 N., R. 6 W., in Wayne County, at bridge on county road, near Buckatunna.

Station 274120 - Chickasawhay River, sec. 24, T. 8 N., R. 7 W., in Wayne County, at bridge on Mississippi State Highway 63, south of Waynesboro.

Station 274125 - Chickasawhay River, sec. 10, T. 8 N., R. 7 W., in Wayne County, at bridge on U. S. Highway 84, west of Waynesboro.

Station 274170 - Souinlovey Creek, sec. 4, T. 2 N., R. 15 E., in Clarke County, at mile 0.4 from the mouth of Souinlovey Creek, west of Quitman.

Station 274195 - Chickasawhay River, sec. 24, T. 4 N., R. 14 E., in Clarke County, at bridge on Mississippi State Highway 513, at Enterprise.

Station 274205 - Chunky River, sec. 13, T. 4 N., R. 14 E., in Clarke County, at bridge on U. S. Highway 11, north of Enterprise.

Station 274220 - Tallahatta Creek, sec. 28, T. 6 N., R. 14 E., in Lauderdale County, at bridge on U. S. Highway 80, west of Meridian.

Station 274240 - Chunky River, sec. 30, T. 6 N., R. 14 E., in Lauderdale County, at bridge on U. S. Highway 80, west of Meridian.

Station 274305 - Okatibbee Creek, sec. 8 T. 4 N., R. 15 E., in Clarke County, at bridge on county road, northeast of Enterprise.

Station 274570 - Leaf River, sec. 29, T. 2 N., R. 8 W., in Greene County, at bridge on U. S. Highway 98, near McLain.

Station 274575 - Gaines Creek, sec. 25, T. 3 N., R. 9 W., in Perry County, at bridge on county road, east of Beaumont.

Station 274590 - Thompson Creek, sec. 33, T. 4 N., R. 9 W., in Perry County, at bridge on county road, east of Hintonville.

Station 274610 - Leaf River, sec. 32, T. 3 N., R. 9 W., in Perry County, at bridge on Mississippi State Highway 15, near Beaumont.

Station 274680 - Leaf River, sec. 15, T. 3 N., R. 10 W., in Perry County, at bridge on county road, northwest of Beaumont.

Station 274683 - Bogue Homo Creek, sec. 33, T. 4 N., R. 10 W., in Perry County, at bridge on county road, northwest of Beaumont.

Station 274690 - Leaf River, sec. 13, T. 3 N., R. 11 W., in Perry County, at bridge on Mississippi State Highway 29, near New Augusta.

Appendix VI (cont.)

Station 274702 - Tallahala Creek, sec. 10, T. 3 N., R. 11 W., in Perry County, at bridge on county road, above mouth of Tallahala Creek.

Station 274730 - Tallahala Creek, sec. 8-9 line, T. 4 N., R. 11 W., in Perry County, at bridge on county road, 3 miles south of Mississippi State Highway 42, south of Runnelstown.

Station 274740 - Tallahala Creek, sec. 1, T. 5 N., R. 12 W., in Forrest County, at bridge on county road, 5 miles southwest of Mississippi State Highway 29, east of Morriston.

Station 274750 - Tallahala Creek, sec. 14, T. 6 N., R. 12 W., in Jones County, at bridge on county road, west of Ovett.

Station 274795 - Tallahala Creek, sec. 35, T. 8 N., R. 12 W., in Jones County, at bridge on county road, east of Ellisville.

Station 274830 - Tallahala Creek, sec. 18, T. 8 N., R. 11 W., in Jones County, at bridge on county road, south of Laurel.

Station 274850 - Tallahala Creek, sec. 8 T. 8 N., R. 11 W., in Jones County, at bridge on Mississippi State Highway 15, at Laurel.

Station 274870 - Tallahala Creek, sec. 33, T. 9 N., R. 11 W., in Jones County, at bridge on Interstate Highway 59, at Laurel.

Station 274890 - Tallahala Creek, sec. 35, T. 10 N., R. 11 W., in Jones County, at bridge on county road, about one mile west of Sandersville.

Station 274940 - Tallahoma Creek, sec. 26, T. 9 N., R. 12 W., in Jones County, at bridge on county road about 1.4 miles north of Mississippi State Highway 84, near Laurel.

Station 275005 - Leaf River, sec. 15, T. 3 N., R. 11 W., in Perry County, at bridge on county road, above mouth of Tallahala Creek, near Mahned.

Station 275050 - Leaf River, sec. 10, T. 3 N., R. 12 W., in Forrest County, at former bridge site near McCallum.

Station 275065 - Leaf River, sec. 32, T. 4 N., R. 12 W., in Forrest County, about 0.9 mile below natural gas line crossing.

Station 275070 - Leaf River, sec. 31, T. 4 N., R. 12 W., in Forrest County, about 0.1 mile below natural gas line crossing.

Appendix VI (cont.)

Station 275198 - Leaf River, sec. 3, T. 4 N., R. 13 W., in Forrest County, at bridge on U. S. Highway 11, at Hattiesburg.

Station 275220 - Bowie River, sec. 30, T. 5 N., R. 13 W., in Forrest County, at bridge on Interstate Highway 59, near Hattiesburg.

Station 275260 - Okatoma Creek, sec. 17, T. 6 N., R. 14 W., in Covington County, at bridge on Mississippi State Highway 598, near Sanford.

Station 275350 - Bowie Creek, sec. 4, T. 5 N., R. 14 W., in Forrest County at bridge on U. S. Highway 49, northwest of Hattiesburg.

Station 275460 - Leaf River, sec. 33, T. 6 N., R. 13 W., in Jones County, at bridge on county road, about one mile west of Eastabutchie.

Station 275500 - Leaf River, sec. 9, T. 6 N., R. 13 W., in Jones County, at bridge on Interstate Highway 59, near Moselle.

Station 275590 - Leaf River, sec. 32, T. 8 N., R. 13 W., in Jones County, at bridge on Mississippi State Highway 588, west of Ellisville.

Station 275610 - Big Creek, sec. 9, T. 8 N., R. 13 W., in Jones County, at bridge on U. S. Highway 84, near Laurel.

Station 275710 - Leaf River, sec. 33, T. 9 N., R. 14 W., in Covington County, at bridge on U. S. Highway 84, near Reddochs.

Station 275730 - Oakohay Creek, sec. 18, T. 9 N., R. 14 W., in Covington County, at bridge on Mississippi State Highway 37, near Hot Coffee.

Station 275810 - Leaf River, sec. 16, T. 10 N., R. 14 W., in Smith County, at bridge on Mississippi State Highway 28, near Taylorsville.

1/ All Sampling Stations are in the State of Mississippi unless otherwise noted.

APPENDIX VII

SURFACE WATER QUALITY DATA

Pascagoula River Basin

STA. 273301 PASCAGOULA BAY

FEBRUARY, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	13.00000	-	-	6.800000	-	8620.000	-	17674.13	483.7296
NO.	-	1.000000	-	-	1.000000	-	1.000000	-	3.000000	3.000000
MIN	-	13.00000	-	-	6.800000	-	8620.000	-	4260.000	330.0000
MAX	-	13.00000	-	-	6.800000	-	8620.000	-	54000.00	700.0000

OCTOBER, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	22.60000	7.460000	85.40000	-	-	12723.33	21000.00	2229.563	31.62277
NO.	-	5.000000	5.000000	5.000000	-	-	3.000000	1.000000	4.000000	4.000000
MIN	-	21.00000	6.300000	72.00000	-	-	12450.00	21000.00	1300.000	20.00000
MAX	-	24.00000	8.000000	94.00000	-	-	12940.00	21000.00	3300.000	50.00000

STA. 273302 PASCAGOULA BAY

FEBRUARY, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	12.00000	10.50000	103.0000	7.400000	-	6325.000	-	29107.40	208.6611
NO.	-	1.000000	1.000000	1.000000	1.000000	-	1.000000	-	3.000000	3.000000
MIN	-	12.00000	10.50000	103.0000	7.400000	-	6325.000	-	13000.00	50.00000
MAX	-	12.00000	10.50000	103.0000	7.400000	-	6325.000	-	54200.00	790.0000

STA. 273303 PASCAGOULA BAY

FEBRUARY, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	12.00000	8.400000	78.00000	6.900000	-	1275.000	-	29107.40	280.0765
NO.	-	1.000000	1.000000	1.000000	1.000000	-	1.000000	-	3.000000	3.000000
MIN	-	12.00000	8.400000	78.00000	6.900000	-	1275.000	-	13000.00	130.0000
MAX	-	12.00000	8.400000	78.00000	6.900000	-	1275.000	-	54200.00	1300.000

OCTOBER, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	22.60000	6.300000	74.00000	-	-	10650.00	18500.00	5217.606	82.62132
NO.	-	5.000000	5.000000	4.000000	-	-	3.000000	1.000000	5.000000	5.000000
MIN	-	21.00000	5.900000	69.00000	-	-	9250.000	18500.00	490.0000	20.00000
MAX	-	25.00000	6.700000	80.00000	-	-	12800.00	18500.00	54200.00	500.0000

Notes:

1) Results presented herein were compiled by computer facilities; therefore, averages presented may indicate accuracy beyond testing capabilities.

2) Averages shown for bacteriological parameters are geometric means and not arithmetic averages.

APPENDIX VII (Cont.)

STA. 273304 PASCAGOULA BAY

FEBRUARY, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	12.00000	8.500000	79.00000	6.700000	-	400.0000	-	11859.47	208.0776
NO.	-	1.000000	1.000000	1.000000	1.000000	-	1.000000	-	3.000000	3.000000
MIN	-	12.00000	8.500000	79.00000	6.700000	-	400.0000	-	2500.000	110.0000
MAX	-	12.00000	8.500000	79.00000	6.700000	-	400.0000	-	27800.00	630.0000

STA. 273305 PASCAGOULA BAY

FEBRUARY, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	14.00000	10.30000	99.00000	6.600000	-	320.0000	-	16719.31	120.9188
NO.	-	1.000000	1.000000	1.000000	1.000000	-	1.000000	-	3.000000	3.000000
MIN	-	14.00000	10.30000	99.00000	6.600000	-	320.0000	-	7900.000	80.00000
MAX	-	14.00000	10.30000	99.00000	6.600000	-	320.0000	-	34800.00	170.0000

STA. 273306 PASCAGOULA BAY

FEBRUARY, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	13.00000	8.900000	84.00000	6.500000	-	240.0000	-	11304.96	263.0296
NO.	-	1.000000	1.000000	1.000000	1.000000	-	1.000000	-	3.000000	3.000000
MIN	-	13.00000	8.900000	84.00000	6.500000	-	240.0000	-	3500.000	46.00000
MAX	-	13.00000	8.900000	84.00000	6.500000	-	240.0000	-	24000.00	1720.000

OCTOBER, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	22.60000	6.160000	70.60000	-	-	9514.000	18000.00	4539.692	95.65054
NO.	-	5.000000	5.000000	5.000000	-	-	3.000000	1.000000	5.000000	5.000000
MIN	-	21.00000	5.700000	65.00000	-	-	8536.000	18000.00	700.0000	20.00000
MAX	-	25.00000	6.700000	74.00000	-	-	10150.00	18000.00	54200.00	2780.000

STA. 273307 PASCAGOULA BAY

FEBRUARY, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	14.00000	10.30000	104.0000	7.500000	-	4585.000	-	2723.967	335.7082
NO.	-	1.000000	1.000000	1.000000	1.000000	-	1.000000	-	2.000000	2.000000
MIN	-	14.00000	10.30000	104.0000	7.500000	-	4585.000	-	2120.000	230.0000
MAX	-	14.00000	10.30000	104.0000	7.500000	-	4585.000	-	3500.000	490.0000

STA. 273308 PASCAGOULA BAY

FEBRUARY, 1965

	00060 STREAM FLOW CUFT/SEC	00010 WATER TEMP CENT	00300 DO MG/L	00301 DO SATUR PERCENT	00400 PH SU	00310 BOD 5 DAY MG/L	00940 CHLORIDE CL MG/L	00095 CNDUCTVY AT 25C MICROMHO	31505GM COLIFORM MPN CONF /100ML	31615GM FEC COLI EC 44.5 T./100ML
AVE	-	14.00000	10.00000	105.0000	7.600000	-	6545.000	-	2550.294	151.9868
NO.	-	1.000000	1.000000	1.000000	1.000000	-	1.000000	-	2.000000	2.000000
MIN	-	14.00000	10.00000	105.0000	7.600000	-	6545.000	-	1200.000	70.00000
MAX	-	14.00000	10.00000	105.0000	7.600000	-	6545.000	-	5420.000	330.0000

OCTOBER, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	23.40000	6.680000	77.60000	-	-	11120.00	22500.00	241.9514	19.99999
NO.	-	5.000000	5.000000	5.000000	-	-	3.000000	1.000000	5.000000	5.000000
MIN	-	21.00000	5.800000	66.00000	-	-	10000.00	22500.00	60.00000	20.00000
MAX	-	26.00000	7.500000	83.00000	-	-	13200.00	22500.00	1410.000	20.00000

STA. 273309 PASCAGOULA BAY

FEBRUARY, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	13.00000	11.00000	113.0000	7.800000	-	7920.000	-	3895.638	104.3551
NO.	-	1.000000	1.000000	1.000000	1.000000	-	1.000000	-	2.000000	2.000000
MIN	-	13.00000	11.00000	113.0000	7.800000	-	7920.000	-	2800.000	33.00000
MAX	-	13.00000	11.00000	113.0000	7.800000	-	7920.000	-	5420.000	330.0000

STA. 273310 PASCAGOULA BAY

FEBRUARY, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	13.00000	9.600000	95.00000	7.700000	-	5265.000	-	4346.423	105.7616
NO.	-	1.000000	1.000000	1.000000	1.000000	-	1.000000	-	3.000000	3.000000
MIN	-	13.00000	9.600000	95.00000	7.700000	-	5265.000	-	1400.000	70.00000
MAX	-	13.00000	9.600000	95.00000	7.700000	-	5265.000	-	17000.00	130.0000

OCTOBER, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	22.40000	7.180000	81.60000	-	-	12943.33	23000.00	145.5432	19.99999
NO.	-	5.000000	5.000000	5.000000	-	-	3.000000	1.000000	5.000000	5.000000
MIN	-	21.00000	6.900000	78.00000	-	-	11790.00	23000.00	70.00000	20.00000
MAX	-	24.00000	7.500000	88.00000	-	-	13850.00	23000.00	490.0000	20.00000

STA. 273311 PASCAGOULA BAY

FEBRUARY, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	14.00000	9.100000	91.00000	7.400000	-	3670.000	-	1401.155	71.09634
NO.	-	1.000000	1.000000	1.000000	1.000000	-	1.000000	-	3.000000	3.000000
MIN	-	14.00000	9.100000	91.00000	7.400000	-	3670.000	-	460.0000	33.00000
MAX	-	14.00000	9.100000	91.00000	7.400000	-	3670.000	-	4600.000	330.0000

APPENDIX VII (Cont.)

STA. 273311 PASCAGOULA BAY (Cont.)

OCTOBER, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	22.60000	7.000000	80.00000	-	-	11906.66	22500.00	184.9564	19.99999
NO.	-	5.000000	5.000000	5.000000	-	-	3.000000	1.000000	5.000000	5.000000
MIN	-	21.00000	6.600000	75.00000	-	-	10820.00	22500.00	20.00000	20.00000
MAX	-	25.00000	7.500000	89.00000	-	-	13900.00	22500.00	1720.000	20.00000

STA. 273312 PASCAGOULA BAY

FEBRUARY, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	13.00000	9.700000	97.00000	7.400000	-	6315.000	-	5225.564	114.3695
NO.	-	1.000000	1.000000	1.000000	1.000000	-	1.000000	-	3.000000	3.000000
MIN	-	13.00000	9.700000	97.00000	7.400000	-	6315.000	-	2200.000	80.00000
MAX	-	13.00000	9.700000	97.00000	7.400000	-	6315.000	-	14100.00	170.0000

OCTOBER, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	22.60000	6.540000	74.80000	-	-	12054.66	21000.00	1905.890	44.57614
NO.	-	5.000000	5.000000	5.000000	-	-	3.000000	1.000000	5.000000	5.000000
MIN	-	21.00000	4.800000	57.00000	-	-	9284.000	21000.00	200.0000	20.00000
MAX	-	25.00000	7.700000	89.00000	-	-	13690.00	21000.00	13000.00	200.0000

STA. 273313 PASCAGOULA BAY

FEBRUARY, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	14.00000	-	-	7.700000	-	9575.000	-	3749.399	99.34787
NO.	-	1.000000	-	-	1.000000	-	1.000000	-	2.000000	2.000000
MIN	-	14.00000	-	-	7.700000	-	9575.000	-	3300.000	70.00000
MAX	-	14.00000	-	-	7.700000	-	9575.000	-	4260.000	141.0000

OCTOBER, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	22.60000	7.360000	84.40000	-	-	12910.00	24500.00	563.9266	24.02248
NO.	-	5.000000	5.000000	5.000000	-	-	3.000000	1.000000	5.000000	5.000000
MIN	-	21.00000	6.700000	76.00000	-	-	11960.00	24500.00	170.0000	20.00000
MAX	-	24.00000	7.800000	92.00000	-	-	13700.00	24500.00	4600.000	50.00000

STA. 273314 PASCAGOULA BAY

FEBRUARY, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	13.50000	7.950000	83.00000	7.350000	-	8382.500	-	22985.49	446.5296
NO.	-	2.000000	2.000000	2.000000	2.000000	-	2.000000	-	3.000000	3.000000
MIN	-	13.00000	7.300000	74.00000	6.700000	-	4635.000	-	2300.000	49.00000
MAX	-	14.00000	8.600000	92.00000	8.000000	-	12130.00	-	160000.0	2300.000

APPENDIX VII (Cont.)

STA. 273315 PASCAGOULA BAY

FEBRUARY, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	13.50000	9.700000	107.0000	7.450000	-	13540.00	-	6692.290	349.5995
NO.	-	2.000000	2.000000	2.000000	2.000000	-	2.000000	-	3.000000	3.000000
MIN	-	13.00000	9.100000	101.0000	6.800000	-	12710.00	-	700.0000	80.00000
MAX	-	14.00000	10.30000	113.0000	8.100000	-	14370.00	-	54200.00	1090.000

STA. 273316 PASCAGOULA BAY

FEBRUARY, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	13.50000	9.550000	105.5000	8.050000	-	13715.00	-	1345.011	80.48661
NO.	-	2.000000	2.000000	2.000000	2.000000	-	2.000000	-	3.000000	3.000000
MIN	-	13.00000	9.400000	104.0000	8.000000	-	12450.00	-	790.0000	20.00000
MAX	-	14.00000	9.700000	107.0000	8.100000	-	14980.00	-	2200.000	330.0000

STA. 273317 PASCAGOULA BAY

FEBRUARY, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	13.50000	9.200000	99.50000	8.050000	-	11940.00	-	141.4708	10.84067
NO.	-	2.000000	2.000000	2.000000	2.000000	-	2.000000	-	3.000000	3.000000
MIN	-	13.00000	9.200000	97.00000	7.900000	-	10630.00	-	26.00000	2.000000
MAX	-	14.00000	9.200000	102.0000	8.200000	-	13250.00	-	330.0000	49.00000

STA. 273318 PASCAGOULA BAY

FEBRUARY, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	13.50000	9.250000	100.5000	7.850000	-	12260.00	-	3519.832	128.0579
NO.	-	2.000000	2.000000	2.000000	2.000000	-	2.000000	-	3.000000	3.000000
MIN	-	13.00000	9.200000	99.00000	7.800000	-	11430.00	-	790.0000	50.00000
MAX	-	14.00000	9.300000	102.0000	7.900000	-	13090.00	-	24000.00	600.0000

STA. 273319 PASCAGOULA BAY

FEBRUARY, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	12.50000	10.20000	108.5000	8.200000	-	16370.00	-	235.2250	27.29355
NO.	-	2.000000	2.000000	2.000000	2.000000	-	2.000000	-	3.000000	3.000000
MIN	-	12.00000	9.500000	100.0000	8.100000	-	12450.00	-	22.00000	4.000000
MAX	-	13.00000	10.90000	117.0000	8.300000	-	20290.00	-	3480.000	221.0000

STA. 273320 PASCAGOULA BAY

FEBRUARY, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	12.50000	9.500000	100.0000	8.050000	-	10812.50	-	49.33109	7.730614
NO.	-	2.000000	2.000000	2.000000	2.000000	-	2.000000	-	3.000000	3.000000
MIN	-	12.00000	9.500000	98.00000	8.000000	-	9175.000	-	5.000000	2.000000
MAX	-	13.00000	9.500000	102.0000	8.100000	-	12450.00	-	490.0000	33.00000

OCTOBER, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	22.60000	8.060000	92.20000	-	-	13420.00	26000.00	51.63932	12.61914
NO.	-	5.000000	5.000000	5.000000	-	-	3.000000	1.000000	5.000000	5.000000
MIN	-	21.00000	6.900000	80.00000	-	-	12810.00	26000.00	20.00000	2.000000
MAX	-	25.00000	10.20000	113.0000	-	-	14250.00	26000.00	270.0000	20.00000

STA. 273321 PASCAGOULA BAY

FEBRUARY, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	12.50000	9.350000	88.00000	8.000000	-	11460.00	-	33.16083	5.687733
NO.	-	2.000000	2.000000	2.000000	2.000000	-	2.000000	-	3.000000	3.000000
MIN	-	12.00000	9.100000	86.00000	8.000000	-	10630.00	-	5.000000	2.000000
MAX	-	13.00000	9.600000	90.00000	8.000000	-	12290.00	-	221.0000	46.00000

STA. 273322 PASCAGOULA BAY

FEBRUARY, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	13.00000	9.550000	90.00000	7.950000	-	11380.00	-	651.0830	84.24944
NO.	-	2.000000	2.000000	2.000000	2.000000	-	2.000000	-	3.000000	3.000000
MIN	-	13.00000	9.500000	90.00000	7.900000	-	11270.00	-	50.00000	20.00000
MAX	-	13.00000	9.600000	90.00000	8.000000	-	11490.00	-	2400.000	230.0000

OCTOBER, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	22.80000	7.960000	91.60000	-	-	13540.00	24500.00	150.8833	52.10342
NO.	-	5.000000	5.000000	5.000000	-	-	3.000000	1.000000	5.000000	5.000000
MIN	-	22.00000	7.600000	86.00000	-	-	12620.00	24500.00	20.00000	20.00000
MAX	-	25.00000	8.400000	97.00000	-	-	14000.00	24500.00	9200.000	2400.000

STA. 273420 WEST PASCAGOULA R. U.S. 90

FEBRUARY-APRIL, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	21.93333	6.226666	70.93333	6.500000	1.883333	2298.466	5599.000	18373.38	707.9987
NO.	-	15.00000	15.00000	15.00000	15.00000	12.00000	15.00000	10.00000	16.00000	16.00000
MIN	-	12.00000	4.000000	43.00000	6.000000	.2000000	66.00000	250.0000	400.0000	20.00000
MAX	-	27.00000	8.600000	85.00000	6.900000	9.600000	9075.000	18000.00	240000.0	79000.00

STA. 273420 WEST PASCAGOULA R. U.S. 90 (Cont.)

JUNE-OCTOBER, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	26.50000	6.080000	76.30000	7.160000	2.380000	3965.000	8325.000	4323.726	43.73448
NO.	-	10.00000	10.00000	10.00000	5.000000	5.000000	7.000000	6.000000	10.00000	10.00000
MIN	-	22.00000	4.800000	63.00000	6.600000	1.800000	1100.000	1950.000	330.0000	.0000000
MAX	-	32.00000	7.500000	100.0000	8.400000	3.200000	8825.000	18000.00	34800.00	800.0000

MARCH-APRIL, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	22.84615	75.42857	22.75000	54.57142	-	-	-	-	135.2500	-
NO.	13.00000	7.000000	8.000000	7.000000	-	-	-	-	4.000000	-
MIN	11.00000	26.00000	10.00000	10.00000	-	-	-	-	4.000000	-
MAX	56.00000	290.0000	46.00000	244.0000	-	-	-	-	288.0000	-

JUNE-JULY, 1965

AVE	36.40000	1325.500	170.4000	1096.500	-	-	-	-	-	-
NO.	5.000000	4.000000	5.000000	4.000000	-	-	-	-	-	-
MIN	18.00000	512.0000	36.00000	436.0000	-	-	-	-	-	-
MAX	74.00000	2840.000	410.0000	2430.000	-	-	-	-	-	-

STA. 273440 WEST PASCAGOULA R. SINGING RIVER CAMP

MARCH-APRIL, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	23.53846	6.376923	73.76923	6.369230	2.183333	132.0000	141.5000	555.3694	71.85128
NO.	-	13.00000	13.00000	13.00000	13.00000	12.00000	13.00000	10.00000	13.00000	13.00000
MIN	-	18.00000	5.300000	61.00000	6.000000	.2000000	7.000000	86.00000	90.00000	20.00000
MAX	-	26.00000	7.800000	93.00000	6.700000	6.600000	805.0000	220.0000	4900.000	1090.000

JUNE-JULY, 1965

AVE	-	30.00000	5.940000	78.00000	6.580000	2.100000	613.4000	1160.000	986.2825	74.23193
NO.	-	5.000000	5.000000	5.000000	5.000000	5.000000	5.000000	5.000000	5.000000	5.000000
MIN	-	29.00000	5.200000	70.00000	6.200000	1.000000	275.0000	500.0000	490.0000	20.00000
MAX	-	31.00000	6.300000	81.00000	7.300000	3.200000	1335.000	2150.000	2300.000	490.0000

MARCH-APRIL, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	15.07692	27.38461	13.84615	13.53846	-	-	-	-	39.60000	-
NO.	13.00000	13.00000	13.00000	13.00000	-	-	-	-	3.000000	-
MIN	10.00000	16.00000	10.00000	4.000000	-	-	-	-	19.20000	-
MAX	18.00000	54.00000	18.00000	40.00000	-	-	-	-	72.40000	-

JUNE-JULY, 1965

AVE	16.40000	175.0000	31.20000	141.5000	-	-	-	-	-	-
NO.	5.000000	4.000000	5.000000	4.000000	-	-	-	-	-	-
MIN	12.00000	70.00000	18.00000	52.00000	-	-	-	-	-	-
MAX	22.00000	300.0000	70.00000	230.0000	-	-	-	-	-	-

APPENDIX VII (Cont.)

STA. 273500 PASCAGOULA BAY

FEBRUARY-APRIL, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	22.44444	6.584615	82.11538	8.003703	9.495652	10462.74	27775.00	2152.431	117.5896
NO.	-	27.00000	26.00000	26.00000	27.00000	23.00000	27.00000	20.00000	28.00000	28.00000
MIN	-	14.00000	2.900000	41.00000	7.700000	.2000000	220.0000	20000.00	20.00000	2.000000
MAX	-	27.0000C	9.100000	109.0000	8.300000	113.0000	17760.00	36000.00	92000.00	7900.000

JUNE-SEPTEMBER, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	29.58333	7.179166	98.58333	8.030434	4.347826	11461.04	25173.91	553.8924	144.6371
NO.	-	24.00000	24.00000	24.00000	23.00000	23.00000	22.00000	23.00000	20.00000	20.00000
MIN	-	26.00000	3.900000	51.00000	6.800000	1.900000	6700.000	14000.00	20.00000	.0000000
MAX	-	32.00000	9.300000	140.0000	8.800000	18.00000	13600.00	36000.00	16000.00	5420.000

FEBRUARY-APRIL, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	M[illegible]ESE [illegible]AL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	80.34782	-	-	-	-	-	-	-	3051.000	17.88240
NO.	23.00000	-	-	-	-	-	-	-	4.000000	7.000000
MIN	62.00000	-	-	-	-	-	-	-	432.0000	2.000000
MAX	104.0000	-	-	-	-	-	-	-	10180.00	130.0000

JUNE-SEPTEMBER, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	86.81818	3434.000	536.4000	2893.428	-	-	-	-	-	-
NO.	22.00000	7.000000	10.00000	7.000000	-	-	-	-	-	-
MIN	54.00000	1828.000	326.0000	1502.000	-	-	-	-	-	-
MAX	116.0000	4500.000	700.0000	3902.000	-	-	-	-	-	-

STA. 273501 PASCAGOULA R. AT MOUTH

JUNE-OCTOBER, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	26.12500	5.687096	71.06451	7.763636	4.057142	10567.95	21540.90	5179.842	1376.652
NO.	-	32.00000	31.00000	31.00000	22.00000	28.00000	21.00000	22.00000	19.00000	19.00000
MIN	-	13.00000	2.500000	33.00000	7.000000	.6000000	5915.000	2900.000	170.0000	40.00000
MAX	-	31.00000	9.900000	140.0000	8.800000	8.100000	14150.00	35500.00	92000.00	9200.000

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	79.75000	3231.200	459.0000	2784.000	-	-	-	-	-	-
NO.	20.00000	5.000000	9.000000	5.000000	-	-	-	-	-	-
MIN	52.00000	2136.000	290.0000	1848.000	-	-	-	-	-	-
MAX	118.0000	4160.000	572.0000	3614.000	-	-	-	-	-	-

STA. 273570 PASCAGOULA R. U.S. 90 PASCAGOULA

FEBRUARY-APRIL, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	21.96428	5.688888	69.11111	7.403571	18.87894	8404.142	24675.00	45938.89	1758.697
NO.	-	28.00000	27.00000	27.00000	28.00000	19.00000	28.00000	20.00000	29.00000	29.00000
MIN	-	12.00000	4.000000	54.00000	5.900000	.6000000	110.0000	7500.000	2210.000	200.0000
MAX	-	26.00000	8.500000	91.00000	8.100000	108.0000	20050.00	36000.00	1600000.	348000.0

JUNE-OCTOBER, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	27.87096	4.838709	62.48387	7.325000	5.317391	8551.960	18108.33	13323.12	1083.442
NO.	-	31.00000	31.00000	31.00000	24.00000	23.00000	25.00000	24.00000	25.00000	25.00000
MIN	-	18.00000	2.300000	29.00000	6.300000	1.400000	3480.000	8000.000	400.0000	20.00000
MAX	-	33.00000	8.000000	106.0000	8.600000	30.00000	13890.00	37000.00	310000.0	24000.00

MARCH-APRIL, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	68.40000	-	122.0000	-	-	-	-	-	3742.066	1337.385
NO.	25.00000	-	1.000000	-	-	-	-	-	3.000000	2.000000
MIN	16.00000	-	122.0000	-	-	-	-	-	182.2000	542.0000
MAX	102.0000	-	122.0000	-	-	-	-	-	10180.00	3300.000

JUNE-SEPTEMBER, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	61.72727	2933.714	374.2000	2522.285	-	-	.0000000	-	-	-
NO.	22.00000	7.000000	10.00000	7.000000	-	-	1.000000	-	-	-
MIN	20.00000	1186.000	108.0000	1012.000	-	-	.0000000	-	-	-
MAX	116.0000	4500.000	700.0000	3880.000	-	-	.0000000	-	-	-

STA. 273580 PASCAGOULA R. W. MOSS POINT

JUNE-OCTOBER, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	27.44444	3.300000	41.81481	6.690909	10.48260	6078.772	12539.13	24840.69	5414.046
NO.	-	27.00000	27.00000	27.00000	22.00000	23.00000	22.00000	23.00000	20.00000	20.00000
MIN	-	15.00000	.0000000	.0000000	2.500000	1.400000	1090.000	2500.000	1090.000	20.00000
MAX	-	31.00000	6.900000	84.00000	8.500000	30.00000	12450.00	34000.00	348000.0	160000.0

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	46.66666	2194.285	288.6666	1909.142	-	-	-	-	-	-
NO.	21.00000	7.000000	9.000000	7.000000	-	-	-	-	-	-
MIN	.0000000	360.0000	46.00000	314.0000	-	-	-	-	-	-
MAX	100.0000	5000.000	650.0000	4390.000	-	-	-	-	-	-

APPENDIX VII (Cont.)

STA. 273590 PASCAGOULA R. BELOW ESCATAWPA R.

APRIL, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	25.00000	3.350000	40.75000	6.700000	9.771428	2492.250	6451.250	129282.6	60499.17
NO.	-	8.000000	8.000000	8.000000	8.000000	7.000000	8.000000	8.000000	5.000000	5.000000
MIN	-	24.00000	1.400000	17.00000	6.000000	1.200000	40.00000	160.0000	70000.00	27000.00
MAX	-	26.00000	5.100000	62.00000	7.600000	36.00000	7030.000	17500.00	172000.0	172000.0

JUNE-OCTOBER, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	28.68000	2.988000	38.48000	6.621739	10.42916	3178.043	6573.500	40568.32	4447.411
NO.	-	25.00000	25.00000	25.00000	23.00000	24.00000	23.00000	24.00000	21.00000	21.00000
MIN	-	19.00000	.0000000	.0000000	5.900000	1.600000	360.0000	64.00000	790.0000	.0000000
MAX	-	31.00000	7.000000	93.00000	7.400000	50.00000	10810.00	17500.00	542000.0	348000.0

APRIL, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	28.00000	28.00000	23.33333	14.00000	-	-	-	-	-	-
NO.	7.000000	2.000000	3.000000	2.000000	-	-	-	-	-	-
MIN	10.00000	20.00000	12.00000	8.000000	-	-	-	-	-	-
MAX	52.00000	36.00000	42.00000	20.00000	-	-	-	-	-	-

JUNE-SEPTEMBER, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	26.95454	1299.142	176.8000	1119.714	-	-	-	-	-	-
NO.	22.00000	7.000000	10.00000	7.000000	-	-	-	-	-	-
MIN	14.00000	134.0000	30.00000	104.0000	-	-	-	-	-	-
MAX	58.00000	2560.000	392.0000	2284.000	-	-	-	-	-	-

STA. 273591 PASCAGOULA R. BELOW ESCATAWPA R.

APRIL, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	24.87500	2.714285	33.71428	7.085714	27.90000	4618.571	13841.42	38311.78	7990.486
NO.	-	8.000000	7.000000	7.000000	7.000000	7.000000	7.000000	7.000000	5.000000	5.000000
MIN	-	23.00000	1.400000	17.00000	6.300000	.0000000	35.00000	190.0000	700.0000	20.00000
MAX	-	26.00000	4.300000	53.00000	7.600000	180.0000	10450.00	30000.00	160000.0	160000.0

JUNE-OCTOBER, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	28.72000	2.216000	29.36000	6.560869	10.00833	3209.956	6450.416	40618.72	4102.861
NO.	-	25.00000	25.00000	25.00000	23.00000	24.00000	23.00000	24.00000	21.00000	21.00000
MIN	-	18.00000	.0000000	.0000000	5.800000	.8000000	522.0000	1200.000	1410.000	.0000000
MAX	-	31.00000	6.200000	83.00000	7.400000	48.00000	9071.000	19000.00	920000.0	920000.0

APRIL, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	42.28571	20.00000	33.00000	8.000000	-	-	-	-	-	-
NO.	7.000000	1.000000	2.000000	1.000000	-	-	-	-	-	-
MIN	16.00000	20.00000	12.00000	8.000000	-	-	-	-	-	-
MAX	86.00000	20.00000	54.00000	8.000000	-	-	-	-	-	-

APPENDIX VII (Cont.)

STA. 273591 PASCAGOULA R. BELOW ESCATAWPA R. (Cont.)

JUNE-SEPTEMBER, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	27.45454	1298.285	214.1000	1069.857	-	-	.0000000	-	-	-
NO.	22.00000	7.000000	10.00000	7.000000	-	-	1.000000	-	-	-
MIN	14.00000	158.0000	27.00000	131.0000	-	-	.0000000	-	-	-
MAX	60.00000	2800.000	650.0000	2448.000	-	-	.0000000	-	-	-

STA. 273605 ESCATAWPA R. MISS. 63 MOSS POINT

MARCH-APRIL, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	23.68000	2.912000	34.20000	6.320000	27.46363	4014.760	9937.631	506587.8	35736.23
NO.	-	25.00000	25.00000	25.00000	25.00000	22.00000	25.00000	19.00000	25.00000	25.00000
MIN	-	19.00000	.0000000	.0000000	5.100000	.8000000	16.00000	120.0000	200.0000	200.0000
MAX	-	30.00000	6.300000	76.00000	7.700000	210.0000	11350.00	25000.00	16000000	5420000.

JUNE-OCTOBER, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	28.50000	.7500000	9.730769	6.183333	18.92916	2359.750	5402.173	325108.2	40110.55
NO.	-	26.00000	26.00000	26.00000	24.00000	24.00000	24.00000	23.00000	22.00000	22.00000
MIN	-	19.00000	.0000000	.0000000	5.400000	3.000000	85.00000	700.0000	5420.000	400.0000
MAX	-	31.00000	4.800000	62.00000	7.000000	64.80000	5010.000	10000.00	16000000	1600000.

MARCH-APRIL. 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	26.26086	40.00000	17.07692	28.90909	-	-	-	-	156.5142	111.8136
NO.	23.00000	11.00000	13.00000	11.00000	-	-	-	-	7.000000	6.000000
MIN	3.000000	14.00000	2.000000	6.000000	-	-	-	-	4.000000	49.00000
MAX	78.00000	146.0000	66.00000	120.0000	-	-	-	-	482.0000	340.0000

JUNE-SEPTEMBER, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	22.17391	1048.857	166.0000	856.2857	-	-	.0000000	-	-	-
NO.	23.00000	7.000000	10.00000	7.000000	-	-	1.000000	-	-	-
MIN	10.00000	280.0000	40.00000	238.0000	-	-	.0000000	-	-	-
MAX	50.00000	1800.000	400.0000	1540.000	-	-	.0000000	-	-	-

STA. 273610 ESCATAWPA R. R.R. BRIDGE MOSS POINT

APRIL, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	25.25000	.3500000	4.125000	6.075000	43.14000	2938.250	5662.500	1565923.	607397.9
NO.	-	8.000000	8.000000	8.000000	8.000000	5.000000	8.000000	8.000000	5.000000	5.000000
MIN	-	24.00000	.0000000	.0000000	5.100000	11.70000	41.00000	150.0000	160000.0	160000.0
MAX	-	26.00000	2.400000	28.00000	6.900000	108.0000	8125.000	18500.00	5420000.	3480000.

JUNE-OCTOBER, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	27.80000	.3750000	4.800000	6.047368	28.23000	2081.842	4645.000	369539.7	60196.74
NO.	-	20.00000	20.00000	20.00000	19.00000	20.00000	19.00000	20.00000	17.00000	17.00000
MIN	-	19.00000	.0000000	.0000000	5.000000	1.400000	765.0000	1500.000	16000.00	1300.000
MAX	-	29.00000	2.900000	36.00000	6.900000	150.0000	4950.000	10000.00	16000000	9200000.

APPENDIX VII (Cont.)

STA. 273610 ESCATAWPA R. R.R. BRIDGE MOSS POINT (Cont.)

APRIL, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	22.00000	27.00000	57.00000	19.00000	-	-	-	-	391.9333	-
NO.	8.000000	2.000000	4.000000	2.000000	-	-	-	-	3.000000	-
MIN	2.000000	24.00000	6.000000	18.00000	-	-	-	-	12.80000	-
MAX	78.00000	30.00000	114.0000	20.00000	-	-	-	-	672.0000	-

JUNE-SEPTEMBER, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	20.21052	922.6666	140.0000	782.0000	1100.000	-	-	-	-	-
NO.	19.00000	3.000000	5.000000	3.000000	1.000000	-	-	-	-	-
MIN	2.000000	850.0000	62.00000	700.0000	1100.000	-	-	-	-	-
MAX	60.00000	1058.000	216.0000	906.0000	1100.000	-	-	-	-	-

JUNE 29, 1965

	RESIDUE TOTAL MG/L	RESIDUE TOT FLT MG/L	RESIDUE TOT NFLT MG/L	ORG N N MG/L	AMMONIA NH3-N MG/L	NITRITE NO2-N MG/L	NITRATE NO3-N MG/L	T PO4 PO4 MG/I	POLY PO4 PO4 MG/L	ORTHOPO4 PO4 MG/L
AVE	-	-	-	-	-	-	1.400000	-	-	-
NO.	-	-	-	-	-	-	1.000000	-	-	-
MIN	-	-	-	-	-	-	1.400000	-	-	-
MAX	-	-	-	-	-	-	1.400000	-	-	-

STA. 273620 ESCATAWPA R. MILE 5.60

APRIL, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	24.37500	4.550000	53.50000	5.850000	8.333333	1374.500	1181.125	29873.24	17447.73
NO.	-	8.000000	8.000000	8.000000	8.000000	6.000000	8.000000	8.000000	5.000000	5.000000
MIN	-	23.00000	.0000000	.0000000	5.200000	.1000000	18.00000	70.00000	1090.000	110.0000
MAX	-	25.00000	6.600000	78.00000	6.100000	24.00000	9405.000	4200.000	490000.0	330000.0

JUNE-OCTOBER, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	27.19047	2.852380	35.00000	5.780000	8.816666	951.3157	1977.000	13613.55	2307.080
NO.	-	21.00000	21.00000	21.00000	20.00000	18.00000	19.00000	20.00000	17.00000	17.00000
MIN	-	18.00000	.0000000	.0000000	5.000000	.0000000	12.00000	90.00000	220.0000	.0000000
MAX	-	29.00000	5.400000	66.00000	6.500000	30.00000	3735.000	7000.000	5420000.	1090000.

APRIL, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	6.250000	21.66666	17.83333	16.16666	-	-	-	-	206.2666	-
NO.	8.000000	6.000000	6.000000	6.000000	-	-	-	-	3.000000	-
MIN	4.000000	10.00000	2.000000	8.000000	-	-	-	-	28.80000	-
MAX	14.00000	50.00000	74.00000	38.00000	-	-	-	-	542.0000	-

JUNE-SEPTEMBER, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	9.947368	311.3333	78.80000	232.0000	1100.000	-	.0000000	-	-	-
NO.	19.00000	3.000000	5.000000	3.000000	1.000000	-	1.000000	-	-	-
MIN	2.000000	134.0000	20.00000	114.0000	1100.000	-	.0000000	-	-	-
MAX	38.00000	450.0000	222.0000	390.0000	1100.000	-	.0000000	-	-	-

APPENDIX VII (Cont.)

STA. 273620 ESCATAWPA R. MILE 5.60 (Cont.)

JUNE 29, 1965

	RESIDUE TOTAL MG/L	RESIDUE TOT FLT MG/L	RESIDUE TOT NFLT MG/L	ORG N N MG/L	AMMONIA NH3-N MG/L	NITRITE NO2-N MG/L	NITRATE NO3-N MG/L	T PO4 PO4 MG/I	POLY PO4 PO4 MG/L	ORTHOPO4 PO4 MG/L
AVE	-	-	-	-	-	-	1.800000	-	-	-
NO.	-	-	-	-	-	-	1.000000	-	-	-
MIN	-	-	-	-	-	-	1.800000	-	-	-
MAX	-	-	-	-	-	-	1.800000	-	-	-

STA. 273625 ESCATAWPA RIVER MILE 7.20

APRIL, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	24.62500	6.028571	71.57142	5.875000	11.66250	101.7500	312.2500	5557.484	634.6491
NO.	-	8.000000	7.000000	7.000000	8.000000	8.000000	8.000000	8.000000	5.000000	5.000000
MIN	-	24.00000	5.500000	66.00000	5.600000	.1000000	5.000000	50.00000	490.0000	20.00000
MAX	-	26.00000	6.400000	75.00000	6.200000	90.00000	450.0000	1400.000	92000.00	24000.00

JUNE-OCTOBER, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	26.95238	4.528571	56.23809	5.452631	4.510526	340.7894	2354.368	4079.522	175.6721
NO.	-	21.00000	21.00000	21.00000	19.00000	19.00000	19.00000	19.00000	17.00000	17.00000
MIN	-	18.00000	1.800000	22.00000	4.600000	.6000000	3.000000	30.00000	1300.000	20.00000
MAX	-	29.00000	5.900000	75.00000	6.200000	30.60000	1445.000	32000.00	16000.00	5420.000

APRIL, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	4.500000	24.42857	6.166666	19.14285	-	-	-	-	-	-
NO.	8.000000	7.000000	6.000000	7.000000	-	-	-	-	-	-
MIN	3.000000	7.000000	.0000000	4.000000	-	-	-	-	-	-
MAX	6.000000	66.00000	13.00000	53.00000	-	-	-	-	-	-

JUNE-SEPTEMBER, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	6.058823	49.33333	24.20000	39.00000	-	.0000000	.0000000	-	-	-
NO.	17.00000	3.000000	5.000000	3.000000	-	1.000000	1.000000	-	-	-
MIN	2.000000	18.00000	4.000000	14.00000	-	.0000000	.0000000	-	-	-
MAX	16.00000	100.0000	74.00000	83.00000	-	.0000000	.0000000	-	-	-

STA. 273630 ESCATAWPA R. ORANGE GROVE

MARCH-APRIL, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	1075.250	23.50000	6.416666	74.58333	5.958333	12.10000	16.08333	126.6000	804.9349	89.22644
NO.	8.000000	12.00000	12.00000	12.00000	12.00000	10.00000	12.00000	10.00000	11.00000	11.00000
MIN	703.0000	19.00000	4.600000	56.00000	5.500000	.3000000	3.000000	36.00000	140.0000	20.00000
MAX	2050.000	26.00000	7.200000	85.00000	6.500000	90.00000	80.00000	400.0000	10900.00	2300.000

JUNE-OCTOBER, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	26.80952	5.705000	70.65000	5.500000	1.795000	110.2631	2844.000	3702.192	163.2686
NO.	-	21.00000	20.00000	20.00000	19.00000	20.00000	19.00000	20.00000	17.00000	17.00000
MIN	-	17.00000	4.500000	55.00000	4.900000	.8000000	8.000000	27.00000	630.0000	20.00000
MAX	-	29.00000	7.600000	85.00000	6.300000	3.200000	1760.000	56000.00	13000.00	1200.000

STA. 273630 ESCATAWPA R. ORANGE GROVE (Cont.)

MARCH-APRIL, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	5.727272	11.91666	4.100000	7.500000	-	-	-	-	162.9750	-
NO.	11.00000	12.00000	10.00000	12.00000	-	-	-	-	4.000000	-
MIN	4.000000	4.000000	.0000000	.0000000	-	-	-	-	24.00000	-
MAX	9.000000	30.00000	12.00000	13.00000	-	-	-	-	524.0000	-

JUNE-SEPTEMBER, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	3.722222	12.66666	5.200000	7.333333	1500.000	-	-	-	-	-
NO.	18.00000	3.000000	5.000000	3.000000	1.000000	-	-	-	-	-
MIN	2.000000	9.000000	2.000000	5.000000	1500.000	-	-	-	-	-
MAX	8.000000	20.00000	10.00000	10.00000	1500.000	-	-	-	-	-

JUNE 29, 1965

	RESIDUE TOTAL MG/L	RESIDUE TOT FLT MG/L	RESIDUE TOT NFLT MG/L	ORG N N MG/L	AMMONIA NH3-N MG/L	NITRITE NO2-N MG/L	NITRATE NO3-N MG/L	T PO4 PO4 MG/l	POLY PO4 PO4 MG/L	ORTHOPO4 PO4 MG/L
AVE	-	-	-	-	-	-	2.800000	-	-	-
NO.	-	-	-	-	-	-	1.000000	-	-	-
MIN	-	-	-	-	-	-	2.800000	-	-	-
MAX	-	-	-	-	-	-	2.800000	-	-	-

STA. 273635 ESCATAWPA R. MILE 12.70

JUNE-OCTOBER, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	520.5000	23.48148	6.500000	75.26923	6.144444	1.708695	187.2777	2327.105	6487.324	245.6932
NO.	4.000000	27.00000	26.00000	26.00000	18.00000	23.00000	18.00000	19.00000	16.00000	16.00000
MIN	435.0000	14.00000	5.300000	65.00000	5.500000	.3000000	6.000000	25.00000	1720.000	20.00000
MAX	609.0000	28.00000	8.800000	87.00000	6.800000	3.700000	1003.000	41000.00	54200.00	2400.000

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	8.294117	14.00000	8.500000	6.000000	-	-	.0000000	95.00000	-	-
NO.	17.00000	3.000000	4.000000	3.000000	-	-	1.000000	2.000000	-	-
MIN	3.000000	12.00000	6.000000	2.000000	-	-	.0000000	90.00000	-	-
MAX	16.00000	18.00000	10.00000	10.00000	-	-	.0000000	100.0000	-	-

	RESIDUE OTAL MG/L	RESIDUE TOT FLT MG/L	RESIDUE TOT NFLT MG/L	ORG N N MG/L	AMMONIA NH3-N MG/L	NITRITE NO2-N MG/L	NITRATE NO3-N MG/L	T PO4 PO4 MG/L	POLY PO4 PO4 MG/L	ORTHOPO4 PO4 MG/L
AVE	98.00000	27.66666	70.33333	.2000000	.3000000	.0230000	1.166666	.0400000	.0200000	.0200000
NO.	3.000000	3.000000	3.000000	1.000000	1.000000	1.000000	3.000000	1.000000	1.000000	1.000000
MIN	34.00000	18.00000	16.00000	.2000000	.3000000	.0230000	.1000000	.0400000	.0200000	.0200000
MAX	184.0000	44.00000	163.0000	.2000000	.3000000	.0230000	1.800000	.0400000	.0200000	.0200000

APPENDIX VII (Cont.)

STA. 273640 ESCATAWPA R. NEAR GOODES MILL LAKE

MARCH-APRIL, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	22.83333	6.650000	76.50000	6.050000	1.690000	50.66666	461.6000	998.8421	66.28279
NO.	-	12.00000	12.00000	12.00000	12.00000	10.00000	12.00000	10.00000	12.00000	11.00000
MIN	-	18.00000	6.000000	71.00000	5.600000	.7000000	4.000000	40.00000	230.0000	20.00000
MAX	-	25.00000	7.400000	87.00000	6.700000	4.000000	200.0000	2500.000	4900.000	1720.000

JUNE 25, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	27.00000	6.700000	83.00000	6.000000	.8000000	6.000000	31.00000	-	-
NO.	-	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	-	-
MIN	-	27.00000	6.700000	83.00000	6.000000	.8000000	6.000000	31.00000	-	-
MAX	-	27.00000	6.700000	83.00000	6.000000	.8000000	6.000000	31.00000	-	-

MARCH-APRIL, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	5.750000	16.18181	2.900000	11.90909	-	-	-	-	36.00000	126.4135
NO.	12.00000	11.00000	10.00000	11.00000	-	-	-	-	1.000000	6.000000
MIN	4.000000	6.000000	.0000000	2.000000	-	-	-	-	36.00000	34.00000
MAX	8.000000	28.00000	6.000000	23.00000	-	-	-	-	36.00000	920.0000

JUNE 25, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	8.000000	-	.0000000	-	-	.0000000	-	-	-	-
NO.	1.000000	-	1.000000	-	-	1.000000	-	-	-	-
MIN	8.000000	-	.0000000	-	-	.0000000	-	-	-	-
MAX	8.000000	-	.0000000	-	-	.0000000	-	-	-	-

STA. 273665 ESCATAWPA R. CO. RD. S.E. HURLEY

MARCH-APRIL, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	1513.583	21.33333	7.590909	82.81818	5.966666	1.040000	21.41666	106.3000	1695.681	271.9279
NO.	12.00000	12.00000	11.00000	11.00000	12.00000	10.00000	12.00000	10.00000	12.00000	12.00000
MIN	500.0000	17.00000	7.300000	60.00000	5.500000	.5000000	5.000000	26.00000	110.0000	20.00000
MAX	7259.000	23.00000	7.900000	89.00000	6.800000	2.400000	69.00000	380.0000	92000.00	17200.00

JUNE, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	391.5000	26.00000	7.225000	87.75000	5.775000	1.275000	6.000000	30.00000	4347.413	769.1553
NO.	4.000000	4.000000	4.000000	4.000000	4.000000	4.000000	4.000000	4.000000	2.000000	2.000000
MIN	298.0000	25.00000	6.900000	82.00000	5.700000	1.100000	5.000000	25.00000	2700.000	170.0000
MAX	443.0000	27.00000	7.400000	90.00000	5.900000	1.800000	7.000000	35.00000	7000.000	3480.000

MARCH-APRIL, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	4.916666	14.41666	3.416666	11.00000	-	-	-	-	-	55.21482
NO.	12.00000	12.00000	12.00000	12.00000	-	-	-	-	-	6.000000
MIN	3.000000	2.000000	.0000000	.0000000	-	-	-	-	-	11.00000
MAX	6.000000	30.00000	8.000000	30.00000	-	-	-	-	-	542.0000

APPENDIX VII (Cont.)

STA. 273665 ESCATAWPA R. CO. RD. S.E. HURLEY (Cont.)

JUNE, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	6.000000	7.500000	2.500000	3.500000	1100.000	.0000000	-	-	-	-
NO.	4.000000	2.000000	4.000000	2.000000	1.000000	1.000000	-	-	-	-
MIN	4.000000	7.000000	.0000000	3.000000	1100.000	.0000000	-	-	-	-
MAX	10.00000	8.000000	4.000000	4.000000	1100.000	.0000000	-	-	-	-

JUNE-OCTOBER, 1965

	RESIDUE TOTAL MG/L	RESIDUE TOT FLT MG/L	RESIDUE TOT NFLT MG/L	ORG N N MG/L	AMMONIA NH3-N MG/L	NITRITE NO2-N MG/L	NITRATE NO3-N MG/L	T PO4 PO4 MG/I	POLY PO4 PO4 MG/L	ORTHOPO4 PO4 MG/L
AVE	-	-	-	.4000000	.4000000	.0180000	.8666666	.0450000	.0100000	.0350000
NO.	-	-	-	2.000000	2.000000	2.000000	3.000000	2.000000	2.000000	2.000000
MIN	-	-	-	.4000000	.4000000	.0120000	.1000000	.0200000	.0000000	.0000000
MAX	-	-	-	.4000000	.4000000	.0240000	2.400000	.0700000	.0200000	.0700000

STA. 273670 ESCATAWPA R. CO. RD. E. HARLESTON

MARCH-APRIL, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	21.25000	7.750000	86.91666	6.000000	.9545454	211.9166	420.9000	831.1545	146.1640
NO.	-	12.00000	12.00000	12.00000	12.00000	11.00000	12.00000	10.00000	12.00000	12.00000
MIN	-	18.00000	7.100000	82.00000	5.300000	.0000000	4.000000	29.00000	130.0000	20.00000
MAX	-	23.00000	8.300000	94.00000	7.400000	2.200000	1660.000	2100.000	24000.00	24000.00

JUNE, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	26.25000	7.525000	92.00000	5.875000	2.500000	23.50000	40.25000	2382.435	172.3368
NO.	-	4.000000	4.000000	4.000000	4.000000	4.000000	4.000000	4.000000	2.000000	2.000000
MIN	-	26.00000	6.900000	84.00000	5.700000	1.500000	4.000000	26.00000	1720.000	110.0000
MAX	-	27.00000	7.900000	96.00000	6.000000	5.500000	44.00000	55.00000	3300.000	270.0000

MARCH-APRIL, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	6.090909	15.27272	3.909090	11.36363	-	-	-	-	84.80000	-
NO.	11.00000	11.00000	11.00000	11.00000	-	-	-	-	3.000000	-
MIN	4.000000	6.000000	.0000000	3.000000	-	-	-	-	22.40000	-
MAX	8.000000	28.00000	10.00000	24.00000	-	-	-	-	176.0000	-

JUNE, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	5.500000	7.000000	9.000000	4.000000	-	.0000000	-	-	-	-
NO.	4.000000	2.000000	4.000000	2.000000	-	1.000000	-	-	-	-
MIN	4.000000	6.000000	2.000000	4.000000	-	.0000000	-	-	-	-
MAX	8.000000	8.000000	26.00000	4.000000	-	.0000000	-	-	-	-

APPENDIX VII (Cont.)

STA. 010050 ESCATAWPA R. U.S. 98 N.W. WILMER

JUNE, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	113.3333	25.50000	6.975000	84.25000	5.975000	1.375000	230.0000	251.2500	8894.942	442.7188
NO.	3.000000	4.000000	4.000000	4.000000	4.000000	4.000000	4.000000	4.000000	2.000000	2.000000
MIN	86.00000	24.00000	4.900000	60.00000	5.700000	1.000000	7.000000	50.00000	4600.000	400.0000
MAX	129.5000	26.00000	7.900000	96.00000	6.200000	1.800000	710.0000	500.0000	17200.00	490.0000

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	7.000000	15.00000	7.500000	10.00000	1100.000	40.00000	-	-	-	-
NO.	4.000000	2.000000	4.000000	2.000000	1.000000	2.000000	-	-	-	-
MIN	4.000000	10.00000	.0000000	6.000000	1100.000	.0000000	-	-	-	-
MAX	8.000000	20.00000	20.00000	14.00000	1100.000	80.00000	-	-	-	-

	RESIDUE TOTAL MG/L	RESIDUE TOT FLT MG/L	RESIDUE TOT NFLT MG/L	ORG N N MG/L	AMMONIA NH3-N MG/L	NITRITE NO2-N MG/L	NITRATE NO3-N MG/L	T PO4 PO4 MG/L	POLY PO4 PO4 MG/L	ORTHOPO4 PO4 MG/L
AVE	-	-	-	.1500000	.2000000	.0305000	.9333333	.0600000	.0000000	.0600000
NO.	-	-	-	2.000000	2.000000	2.000000	3.000000	2.000000	2.000000	2.000000
MIN	-	-	-	.0000000	.2000000	.0270000	.1000000	.0400000	.0000000	.0400000
MAX	-	-	-	.3000000	.2000000	.0340000	2.600000	.0800000	.0000000	.0800000

STA. 273710 PASCAGOULA R. ABOVE ESCATAWPA R.

MARCH-APRIL, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	23.46153	5.461538	63.30769	6.530769	2.909090	1350.615	4555.333	3665.079	548.6124
NO.	-	13.00000	13.00000	13.00000	13.00000	11.00000	13.00000	9.000000	13.00000	13.00000
MIN	-	18.00000	2.000000	25.00000	5.900000	.3000000	5.000000	78.00000	80.00000	20.00000
MAX	-	27.00000	7.000000	83.00000	7.000000	15.00000	8505.000	20000.00	160000.0	130000.0

JUNE-SEPTEMBER, 1965

AVE	-	28.92000	4.737500	61.66666	6.525000	3.887500	1273.208	2503.333	4077.189	320.6343
NO.	-	25.00000	24.00000	24.00000	24.00000	24.00000	24.00000	24.00000	22.00000	22.00000
MIN	-	26.00000	.0000000	.0000000	6.000000	1.200000	30.00000	370.0000	330.0000	.0000000
MAX	-	31.00000	8.000000	102.0000	7.100000	15.00000	5920.000	8800.000	54200.00	17200.00

MARCH-APRIL, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	21.84615	24.25000	20.55555	10.62500	-	-	-	-	-	-
NO.	13.00000	8.000000	9.000000	8.000000	-	-	-	-	-	-
MIN	8.000000	16.00000	10.00000	6.000000	-	-	-	-	-	-
MAX	66.00000	34.00000	76.00000	20.00000	-	-	-	-	-	-

JUNE-SEPTEMBER, 1965

AVE	17.78260	543.7500	82.50000	449.0000	-	-	-	-	-	-
NO.	23.00000	8.000000	10.00000	7.000000	-	-	-	-	-	-
MIN	10.00000	76.00000	20.00000	52.00000	-	-	-	-	-	-
MAX	50.00000	1070.000	222.0000	1030.000	-	-	-	-	-	-

APPENDIX VII (Cont.)

STA. 273745 PASCAGOULA R. CUMBEST BLUFF

MARCH-APRIL, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	6228.250	23.69230	6.584615	76.46153	6.361538	2.650000	94.00000	124.7000	1739.281	124.6102
NO.	8.000000	13.00000	13.00000	13.00000	13.00000	12.00000	13.00000	10.00000	13.00000	13.00000
MIN	4678.000	18.00000	5.600000	61.00000	6.000000	.6000000	7.000000	76.00000	460.0000	20.00000
MAX	8606.000	26.00000	8.300000	98.00000	6.800000	9.600000	575.0000	170.0000	13000.00	1090.000

JUNE-JULY, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	2455.000	29.20000	6.560000	84.80000	6.500000	1.880000	54.00000	135.0000	1565.656	75.35907
NO.	5.000000	5.000000	5.000000	5.000000	5.000000	5.000000	5.000000	5.000000	5.000000	5.000000
MIN	2322.000	28.00000	5.700000	73.00000	6.100000	.7000000	33.00000	15.00000	330.0000	20.00000
MAX	2592.000	30.00000	7.800000	100.0000	7.300000	2.500000	77.00000	235.0000	5420.000	310.0000

MARCH-APRIL, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	15.61538	27.16666	14.50000	12.50000	-	-	-	-	17.82857	-
NO.	13.00000	12.00000	12.00000	12.00000	-	-	-	-	7.000000	-
MIN	11.00000	18.00000	10.00000	4.000000	-	-	-	-	8.000000	-
MAX	20.00000	46.00000	20.00000	30.00000	-	-	-	-	36.80000	-

JUNE-JULY, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	16.20000	22.00000	14.00000	7.500000	5000.000	1200.000	-	-	-	-
NO.	5.000000	4.000000	5.000000	4.000000	1.000000	1.000000	-	-	-	-
MIN	14.00000	18.00000	12.00000	4.000000	5000.000	1200.000	-	-	-	-
MAX	18.00000	26.00000	16.00000	10.00000	5000.000	1200.000	-	-	-	-

SEPTEMBER, 1965

	RESIDUE TOTAL MG/L	RESIDUE TOT FLT MG/L	RESIDUE TOT NFLT MG/L	ORG N N MG/L	AMMONIA NH3-N MG/L	NITRITE NO2-N MG/L	NITRATE NO3-N MG/L	T PO4 PO4 MG/I	POLY PO4 PO4 MG/L	ORTHOPO4 PO4 MG/L
AVE	-	-	-	.4500000	.3500000	.0095000	.1000000	.0500000	.0300000	.0200000
NO.	-	-	-	2.000000	2.000000	2.000000	2.000000	2.000000	2.000000	2.000000
MIN	-	-	-	.4000000	.3000000	.0080000	.1000000	.0400000	.0200000	.0000000
MAX	-	-	-	.5000000	.4000000	.0110000	.1000000	.0600000	.0400000	.0400000

STA. 273760 RED CR. CO. RD. N. VESTRY

MAY 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	204.6250	25.00000	7.480000	89.20000	6.620000	1.000000	19.50000	61.44444	884.7897	28.84937
NO.	8.000000	10.00000	10.00000	10.00000	10.00000	10.00000	10.00000	9.000000	10.00000	10.00000
MIN	181.0000	22.00000	7.200000	85.00000	6.400000	.0000000	11.00000	30.00000	240.0000	20.00000
MAX	311.0000	26.00000	7.800000	93.00000	6.800000	2.100000	29.00000	110.0000	3450.000	130.0000

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	9.800000	10.20000	5.300000	4.900000	-	-	-	-	-	-
NO.	10.00000	10.00000	10.00000	10.00000	-	-	-	-	-	-
MIN	8.000000	4.000000	.0000000	2.000000	-	-	-	-	-	-
MAX	12.00000	16.00000	9.000000	10.00000	-	-	-	-	-	-

APPENDIX VII (Cont.)

STA. 273765 RED CREEK MISS. 15

MAY, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	24.70000	7.890000	93.70000	6.660000	1.520000	21.80000	80.88888	1662.666	41.25140
NO.	-	10.00000	10.00000	10.00000	10.00000	10.00000	10.00000	9.000000	10.00000	10.00000
MIN	-	22.00000	7.500000	91.00000	6.500000	.8000000	11.00000	50.00000	230.0000	20.00000
MAX	-	26.00000	8.100000	99.00000	6.900000	2.300000	37.00000	100.0000	4600.000	490.0000

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	10.40000	10.30000	5.800000	4.500000	-	-	-	-	-	-
NO.	10.00000	10.00000	10.00000	10.00000	-	-	-	-	-	-
MIN	6.000000	4.000000	4.000000	.0000000	-	-	-	-	-	-
MAX	14.00000	14.00000	8.000000	8.000000	-	-	-	-	-	-

STA. 273770 RED CR. CO. RD. S.E. WIGGINS

MAY, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	23.60000	7.933333	92.11111	6.610000	1.244444	27.30000	65.11111	2124.526	129.1909
NO.	-	10.00000	9.000000	9.000000	10.00000	9.000000	10.00000	9.000000	10.00000	10.00000
MIN	-	23.00000	7.200000	83.00000	6.400000	.4000000	12.00000	6.000000	700.0000	50.00000
MAX	-	25.00000	8.600000	101.0000	6.900000	2.300000	53.00000	130.0000	7900.000	800.0000

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	11.60000	13.20000	5.600000	7.600000	-	-	-	-	-	-
NO.	10.00000	10.00000	10.00000	10.00000	-	-	-	-	-	-
MIN	8.000000	9.000000	.0000000	3.000000	-	-	-	-	-	-
MAX	16.00000	24.00000	11.00000	18.00000	-	-	-	-	-	-

STA. 273775 RED CR. U.S. 49 S. WIGGINS

MAY, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	24.00000	8.120000	95.30000	6.580000	1.350000	16.50000	58.88888	1293.728	39.30504
NO.	-	10.00000	10.00000	10.00000	10.00000	8.000000	10.00000	9.000000	10.00000	10.00000
MIN	-	23.00000	7.400000	85.00000	6.200000	.9000000	12.00000	40.00000	700.0000	20.00000
MAX	-	26.00000	8.900000	104.0000	6.800000	2.200000	21.00000	88.00000	7000.000	110.0000

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	11.80000	14.70000	7.900000	6.800000	-	-	-	-	-	-
NO.	10.00000	10.00000	10.00000	10.00000	-	-	-	-	-	-
MIN	8.000000	12.00000	6.000000	4.000000	-	-	-	-	-	-
MAX	16.00000	24.00000	10.00000	14.00000	-	-	-	-	-	-

APPENDIX VII (Cont.)

STA. 273780 RED CR. MISS. 26 W. WIGGINS

MAY, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	24.40000	7.550000	89.50000	6.730000	1.144444	28.60000	79.77777	1354.749	32.60112
NO.	-	10.00000	10.00000	10.00000	10.00000	9.000000	10.00000	9.000000	9.000000	9.000000
MIN	-	23.00000	5.300000	63.00000	6.500000	.0000000	22.00000	8.000000	700.0000	20.00000
MAX	-	25.00000	8.100000	97.00000	7.100000	3.200000	37.00000	140.0000	2780.000	130.0000

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	14.60000	18.30000	10.60000	7.700000	-	-	-	-	-	-
NO.	10.00000	10.00000	10.00000	10.00000	-	-	-	-	-	-
MIN	10.00000	10.00000	2.000000	.0000000	-	-	-	-	-	-
MAX	26.00000	26.00000	16.00000	14.00000	-	-	-	-	-	-

	RESIDUE TOTAL MG/L	RESIDUE TOT FLT MG/L	RESIDUE TOT NFLT MG/L	ORG N N MG/L	AMMONIA NH3-N MG/L	NITRITE NO2-N MG/L	NITRATE NO3-N MG/L	T PO4 PO4 MG/L	POLY PO4 PO4 MG/L	ORTHOPO4 PO4 MG/L
AVE	-	-	-	-	-	-	.3000000	-	-	-
NO.	-	-	-	-	-	-	1.000000	-	-	-
MIN	-	-	-	-	-	-	.3000000	-	-	-
MAX	-	-	-	-	-	-	.3000000	-	-	-

STA. 273785 RED CR. INTERSTATE 59 S.E. LUMBERTON

MAY, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	24.33333	5.966666	70.55555	6.888888	.7500000	8.666666	57.75000	11765.47	380.0274
NO.	-	9.000000	9.000000	9.000000	9.000000	6.000000	9.000000	8.000000	9.000000	9.000000
MIN	-	22.00000	5.000000	57.00000	6.600000	.3000000	7.000000	40.00000	2300.000	80.00000
MAX	-	25.00000	7.200000	86.00000	7.600000	1.300000	14.00000	140.0000	54200.00	13000.00

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	23.11111	12.00000	4.555555	7.444444	-	-	-	-	-	-
NO.	9.000000	9.000000	9.000000	9.000000	-	-	-	-	-	-
MIN	12.00000	10.00000	.0000000	3.000000	-	-	-	-	-	-
MAX	56.00000	14.00000	7.000000	10.00000	-	-	-	-	-	-

STA. 273800 BLACK CR. MISS. 57

MAY, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	276.5000	25.30000	7.580000	91.40000	6.560000	1.410000	7.900000	46.33333	657.2872	25.17850
NO.	10.00000	10.00000	10.00000	10.00000	10.00000	10.00000	10.00000	9.000000	10.00000	10.00000
MIN	211.0000	22.00000	7.300000	88.00000	6.400000	.5000000	4.000000	20.00000	130.0000	20.00000
MAX	440.0000	27.00000	7.800000	94.00000	6.800000	3.200000	25.00000	186.0000	1720.000	80.00000

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	9.400000	7.900000	3.700000	4.200000	-	-	-	-	-	-
NO.	10.00000	10.00000	10.00000	10.00000	-	-	-	-	-	-
MIN	8.000000	6.000000	.0000000	1.000000	-	-	-	-	-	-
MAX	12.00000	10.00000	8.000000	6.000000	-	-	-	-	-	-

STA. 273810 BLACK CR. MISS. 26 E. WIGGINS

MAY, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	26.00000	7.655555	93.22222	6.590909	1.555555	6.700000	33.00000	600.4900	26.39015
NO.	-	11.00000	9.000000	9.000000	11.00000	9.000000	10.00000	9.000000	10.00000	10.00000
MIN	-	24.00000	7.500000	88.00000	6.200000	.6000000	5.000000	30.00000	170.0000	20.00000
MAX	-	27.00000	7.800000	96.00000	6.800000	2.600000	8.000000	42.00000	2300.000	80.00000

	T ALK ACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	9.000000	8.300000	4.800000	3.500000	-	-	-	-	-	-
NO.	10.00000	10.00000	10.00000	10.00000	-	-	-	-	-	-
MIN	7.000000	4.000000	4.000000	.0000000	-	-	-	-	-	-
MAX	11.00000	10.00000	8.000000	6.000000	-	-	-	-	-	-

STA. 273820 BLACK CR. MISS. 29

MAY, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	26.22222	7.600000	92.77777	6.644444	2.111111	6.888888	39.62500	1584.085	48.02908
NO.	-	9.000000	9.000000	9.000000	9.000000	9.000000	9.000000	8.000000	9.000000	9.000000
MIN	-	25.00000	7.300000	89.00000	6.500000	.6000000	5.000000	36.00000	460.0000	20.00000
MAX	-	27.00000	7.900000	94.00000	6.800000	3.000000	10.00000	41.00000	7900.000	170.0000

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	9.000000	8.111111	4.888888	3.222222	-	-	-	-	-	-
NO.	9.000000	9.000000	9.000000	9.000000	-	-	-	-	-	-
MIN	7.000000	6.000000	4.000000	.0000000	-	-	-	-	-	-
MAX	12.00000	10.00000	6.000000	6.000000	-	-	-	-	-	-

STA. 273830 BLACK CR. OLD U.S. 49 BROOKLYN

MAY, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	24.40000	7.200000	85.10000	6.610000	.5000000	7.000000	36.77777	1249.431	46.73289
NO.	-	10.00000	10.00000	10.00000	10.00000	7.000000	10.00000	9.000000	8.000000	8.000000
MIN	-	24.00000	6.900000	81.00000	6.300000	.0000000	5.000000	30.00000	490.0000	20.00000
MAX	-	25.00000	7.700000	92.00000	7.000000	1.400000	12.00000	40.00000	3300.000	130.0000

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	9.100000	7.600000	3.500000	4.100000	-	-	-	-	-	-
NO.	10.00000	10.00000	10.00000	10.00000	-	-	-	-	-	-
MIN	7.000000	6.000000	.0000000	2.000000	-	-	-	-	-	-
MAX	14.00000	9.000000	6.000000	9.000000	-	-	-	-	-	-

	RESIDUE TOTAL MG/L	RESIDUE TOT FLT MG/L	RESIDUE TOT NFLT MG/L	ORG N N MG/L	AMMONIA NH3-N MG/L	NITRITE NO2-N MG/L	NITRATE NO3-N MG/L	T PO4 PO4 MG/L	POLY PO4 PO4 MG/L	ORTHOPO4 PO4 MG/L
AVE	-	-	-	-	-	-	.4300000	-	-	-
NO.	-	-	-	-	-	-	1.000000	-	-	-
MIN	-	-	-	-	-	-	.4300000	-	-	-
MAX	-	-	-	-	-	-	.4300000	-	-	-

STA. 273835 L. BLACK CR. CO. RD. N. ROCK CITY

MAY, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	23.90000	8.320000	97.70000	6.610000	1.500000	6.333333	25.62500	1907.751	151.1725
NO.	-	10.00000	10.00000	10.00000	10.00000	9.000000	9.000000	8.000000	10.00000	10.00000
MIN	-	22.00000	7.900000	93.00000	6.200000	.1000000	4.000000	20.00000	220.0000	40.00000
MAX	-	25.00000	8.600000	101.0000	7.100000	4.400000	11.00000	50.00000	7000.000	790.0000

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	12.11111	8.222222	3.444444	4.777777	-	-	-	-	-	-
NO.	9 000000	9.000000	9.000000	9.000000	-	-	-	-	-	-
MIN	8.000000	6.000000	.0000000	1.000000	-	-	-	-	-	-
MAX	26.00000	10.00000	6.000000	8.000000	-	-	-	-	-	-

STA. 273840 BLACK CR. U.S. II N.E. PURVIS

MAY 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	24.30000	7.450000	87.90000	6.790000	2.520000	12.20000	61.44444	2808.224	66.79628
NO.	-	10.00000	10.00000	10.00000	10.00000	10.00000	10.00000	9.000000	10.00000	10.00000
MIN	-	22.00000	5.800000	69.00000	6.600000	.1000000	8.000000	15.00000	1720.000	20.00000
MAX	-	26.00000	8.000000	95.00000	7.000000	5.200000	30.00000	80.00000	4900.000	330.0000

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	14.30000	9.100000	5.100000	4.000000	-	-	-	-	-	-
NO.	10.00000	10.00000	10.00000	10.00000	-	-	-	-	-	-
MIN	12.00000	8.000000	3.000000	2.000000	-	-	-	-	-	-
MAX	20.00000	10.00000	6.000000	6.000000	-	-	-	-	-	-

STA. 273843 BLACK CR. MISS. 589 N.W. PURVIS

MAY 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	23.11111	7.437500	86.14285	6.560000	.8444444	4.700000	23.66666	1157.457	149.4794
NO.	-	9.000000	8.000000	7.000000	10.00000	9.000000	10.00000	9.000000	10.00000	10.00000
MIN	-	21.00000	7.200000	83.00000	6.400000	.1000000	2.000000	20.00000	460.0000	50.00000
MAX	-	24.00000	7.900000	91.00000	6.900000	1.700000	8.000000	35.00000	2300.000	790.0000

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	11.60000	8.900000	3.500000	5.400000	-	-	-	-	-	-
NO.	10.00000	10.00000	10.00000	10.00000	-	-	-	-	-	-
MIN	8.000000	8.000000	2.000000	4.000000	-	-	-	-	-	-
MAX	16.00000	10.00000	4.000000	7.000000	-	-	-	-	-	-

STA. 273850 PASCAGOULA R. ABOVE RED AND BLACK CRS.

MARCH-APRIL, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	7319.230	23.23076	6.776923	78.38461	6.376923	2.761538	105.3846	135.7000	2161.088	262.6056
NO.	13.00000	13.00000	13.00000	13.00000	13.00000	13.00000	13.00000	10.00000	13.00000	13.00000
MIN	3760.000	17.00000	5.700000	68.00000	6.100000	.7000000	2.000000	77.00000	460.0000	50.00000
MAX	12500.00	26.00000	8.000000	95.00000	6.700000	9.900000	805.0000	230.0000	10900.00	3400.000
JUNE-JULY, 1965										
AVE	1845.800	29.40000	7.180000	93.00000	6.620000	3.680000	75.20000	176.8000	3496.855	65.40400
NO.	5.000000	5.000000	5.000000	5.000000	5.000000	5.000000	5.000000	5.000000	5.000000	5.000000
MIN	1662.000	28.00000	6.500000	83.00000	6.100000	.5000000	53.00000	19.00000	1480.000	20.00000
MAX	2128.000	31.00000	7.600000	101.0000	7.200000	6.200000	117.0000	330.0000	10900.00	340.0000

APPENDIX VII (Cont.)

STA. 273850 PASCAGOULA R. ABOVE RED AND BLACK CRS. (Cont.)

MARCH-APRIL, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	16.61538	28.07692	14.92307	13.15384	-	-	-	-	-	-
NO.	13.00000	13.00000	13.00000	13.00000	-	-	-	-	-	-
MIN	12.00000	19.00000	12.00000	6.000000	-	-	-	-	-	-
MAX	22.00000	42.00000	18.00000	30.00000	-	-	-	-	-	-

JUNE-JULY, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	17.40000	31.00000	20.40000	8.500000	-	-	-	-	-	-
NO.	5.000000	4.000000	5.000000	4.000000	-	-	-	-	-	-
MIN	15.00000	24.00000	12.00000	4.000000	-	-	-	-	-	-
MAX	20.00000	38.00000	24.00000	14.00000	-	-	-	-	-	-

STA. 273865 PASCAGOULA R. GIBSON LANDING

MARCH-APRIL, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	7319.230	22.61538	6.761538	77.38461	6.376923	2.607692	110.6923	146.0000	5147.665	499.4775
NO.	13.00000	13.00000	13.00000	13.00000	13.00000	13.00000	13.00000	10.00000	13.00000	13.00000
MIN	3760.000	17.00000	5.400000	60.00000	5.900000	.9000000	15.00000	81.00000	790.0000	20.00000
MAX	12500.00	26.00000	8.000000	95.00000	6.700000	10.10000	575.0000	210.0000	160000.0	13000.00

JUNE-JULY, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	1845.800	29.20000	7.680000	99.20000	6.640000	3.480000	97.80000	185.0000	4643.402	50.85056
NO.	5.000000	5.000000	5.000000	5.000000	5.000000	5.000000	5.000000	5.000000	5.000000	5.000000
MIN	1662.000	28.00000	6.500000	83.00000	5.900000	.5000000	50.00000	40.00000	2300.000	20.00000
MAX	2128.000	30.00000	8.800000	116.0000	7.100000	5.400000	146.0000	300.0000	17200.00	250.0000

MARCH-APRIL, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	17.15384	28.15384	15.69230	12.66666	-	-	-	-	12.50000	-
NO.	13.00000	13.00000	13.00000	12.00000	-	-	-	-	2.000000	-
MIN	11.00000	20.00000	12.00000	6.000000	-	-	-	-	9.000000	-
MAX	22.00000	52.00000	20.00000	38.00000	-	-	-	-	16.00000	-

JUNE-JULY, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	18.00000	33.75000	22.20000	9.750000	-	-	-	-	-	-
NO.	5.000000	4.000000	5.000000	4.000000	-	-	-	-	-	-
MIN	14.00000	25.00000	14.00000	7.000000	-	-	-	-	-	-
MAX	20.00000	38.00000	28.00000	12.00000	-	-	-	-	-	-

STA. 273870 PASCAGOULA R. WILKERSON FERRY

MARCH-APRIL, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	7319.230	22.61538	6.792307	77.69230	6.469230	2.753846	100.7692	168.1111	5403.587	680.0338
NO.	13.00000	13.00000	13.00000	13.00000	13.00000	13.00000	13.00000	9.000000	13.00000	13.00000
MIN	3760.000	17.00000	5.100000	57.00000	6.000000	.3000000	9.000000	90.00000	790.0000	50.00000
MAX	12500.00	25.00000	7.800000	93.00000	6.900000	8.100000	575.0000	280.0000	160000.0	54200.00

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	17.07692	29.38461	16.15384	13.23076	-	-	-	-	-	97.26844
NO.	13.00000	13.00000	13.00000	13.00000	-	-	-	-	-	6.000000
MIN	12.00000	18.00000	12.00000	4.000000	-	-	-	-	-	17.00000
MAX	24.00000	68.00000	22.00000	54.00000	-	-	-	-	-	1600.000

STA. 273880 PASCAGOULA R. MISS. 26

MARCH-APRIL, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	7319.230	22.38461	6.853846	78.30769	6.592307	3.292307	336.0769	296.0000	5527.084	881.3829
NO.	13.00000	13.00000	13.00000	13.00000	13.00000	13.00000	13.00000	9.000000	13.00000	13.00000
MIN	3760.000	17.00000	6.000000	67.00000	5.600000	1.600000	16.00000	175.0000	940.0000	110.0000
MAX	12500.00	25.00000	7.800000	92.00000	7.300000	11.60000	2880.000	500.0000	54200.00	17200.00

JUNE-JULY, 1965

AVE	1845.800	28.80000	7.280000	93.20000	6.660000	3.980000	85.40000	166.0000	10244.29	17.86546
NO.	5.000000	5.000000	5.000000	5.000000	5.000000	5.000000	5.000000	5.000000	5.000000	5.000000
MIN	1662.000	28.00000	6.800000	86.00000	6.400000	.8000000	41.00000	40.00000	2780.000	.0000000
MAX	2128.000	30.00000	8.000000	102.0000	7.000000	6.400000	145.0000	300.0000	24000.00	1300.000

MARCH-APRIL, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	17.07692	35.00000	16.23076	18.00000	-	-	-	-	25.06666	84.88993
NO.	13.00000	13.00000	13.00000	13.00000	-	-	-	-	3.000000	5.000000
MIN	12.00000	20.00000	13.00000	4.000000	-	-	-	-	11.20000	14.00000
MAX	22.00000	70.00000	20.00000	52.00000	-	-	-	-	36.80000	542.0000

JUNE-JULY, 1965

AVE	19.80000	36.50000	21.40000	13.75000	-	-	-	-	-	-
NO.	5.000000	4.000000	5.000000	4.000000	-	-	-	-	-	-
MIN	14.00000	26.00000	16.00000	9.000000	-	-	-	-	-	-
MAX	32.00000	46.00000	26.00000	20.00000	-	-	-	-	-	-

APPENDIX VII (Cont.)

STA. 273895 PASCAGOULA R. CO. RD. MERRILL

JUNE-JULY, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	1845.800	29.20000	7.220000	93.40000	6.740000	3.320000	113.4000	120.2000	4410.700	60.03699
NO.	5.000000	5.000000	5.000000	5.000000	5.000000	5.000000	5.000000	5.000000	5.000000	5.000000
MIN	1662.000	28.00000	6.600000	83.00000	6.100000	.8000000	57.00000	22.00000	400.0000	.0000000
MAX	2128.000	30.00000	8.000000	105.0000	7.600000	5.100000	160.0000	190.0000	34800.00	2400.000

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	18.40000	33.50000	20.40000	11.50000	-	-	-	-	-	-
NO.	5.000000	4.000000	5.000000	4.000000	-	-	-	-	-	-
MIN	12.00000	28.00000	14.00000	10.00000	-	-	-	-	-	-
MAX	22.00000	40.00000	26.00000	14.00000	-	-	-	-	-	-

STA. 273910 CHICKASAWHAY R. U.S. 98 N.W. LUCEDALE

JUNE-OCTOBER 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	25.46666	6.986666	84.13333	6.633333	2.385714	64.73333	172.5000	4328.522	134.7483
NO.	-	15.00000	15.00000	15.00000	15.00000	14.00000	15.00000	6.000000	15.00000	15.00000
MIN	-	22.00000	6.100000	70.00000	5.800000	.4000000	16.00000	20.00000	790.0000	20.00000
MAX	-	28.00000	8.000000	99.00000	7.100000	4.500000	100.0000	295.0000	348000.0	34000.00

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	21.00000	-	33.20000	-	-	-	-	-	-	-
NO.	15.00000	-	5.000000	-	-	-	-	-	-	-
MIN	10.00000	-	20.00000	-	-	-	-	-	-	-
MAX	30.00000	-	50.00000	-	-	-	-	-	-	-

	RESIDUE TOTAL MG/L	RESIDUE TOT FLT MG/L	RESIDUE TOT NFLT MG/L	ORG N N MG/L	AMMONIA NH3-N MG/L	NITRITE NO2-N MG/L	NITRATE NO3-N MG/L	T PO4 PO4 MG/L	POLY PO4 PO4 MG/L	ORTHOPO4 PO4 MG/L
AVE	340.0000	219.0000	121.3333	.3666666	.2666666	.0063333	.5866666	.1133333	.0733333	.0400000
NO.	3.000000	3.000000	3.000000	3.000000	3.000000	3.000000	6.000000	3.000000	3.000000	3.000000
MIN	244.0000	14.00000	56.00000	.2000000	.2000000	.0000000	.1000000	.0400000	.0000000	.0000000
MAX	530.0000	453.0000	230.0000	.6000000	.4000000	.0140000	1.400000	.2100000	.2100000	.0800000

APPENDIX VII (Cont.)

STA. 273920 BIG CR. CO. RD. S.W. LEAKESVILLE

MAY-OCTOBER, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	64.50000	24.62500	7.300000	86.81250	5.856250	1.793750	7.375000	67.28571	5170.467	273.0765
NO.	9.000000	16.00000	16.00000	16.00000	16.00000	16.00000	16.00000	7.000000	15.00000	15.00000
MIN	32.00000	21.00000	6.200000	70.00000	5.100000	.1000000	3.000000	20.00000	630.0000	20.00000
MAX	251.0000	27.00000	7.900000	93.00000	6.900000	3.600000	19.00000	290.0000	160000.0	17200.00

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	6.750000	10.00000	2.333333	8.000000	800.0000	.0000000	-	-	-	-
NO.	16.00000	1.000000	6.000000	1.000000	1.000000	1.000000	-	-	-	-
MIN	2.000000	10.00000	.0000000	8.000000	800.0000	.0000000	-	-	-	-
MAX	14.00000	10.00000	6.000000	8.000000	800.0000	.0000000	-	-	-	-

	RESIDUE TOTAL MG/L	RESIDUE TOT FLT MG/L	RESIDUE TOT NFLT MG/L	ORG N N MG/L	AMMONIA NH3-N MG/L	NITRITE NO2-N MG/L	NITRATE NO3-N MG/L	T PO4 PO4 MG/L	POLY PO4 PO4 MG/L	ORTHOPO4 PO4 MG/L
AVE	-	-	-	-	-	-	2.400000	-	-	-
NO.	-	-	-	-	-	-	1.000000	-	-	-
MIN	-	-	-	-	-	-	2.400000	-	-	-
MAX	-	-	-	-	-	-	2.400000	-	-	-

STA. 273940 CHICKASAWHAY R. S. LEAKESVILLE

JUNE-OCTOBER, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	28.00000	25.50000	7.106666	86.26666	6.693333	2.066666	68.06666	198.3333	7798.266	153.1607
NO.	1.000000	14.00000	15.00000	15.00000	15.00000	15.00000	15.00000	6.000000	15.00000	15.00000
MIN	28.00000	22.00000	6.400000	74.00000	6.000000	.2000000	38.00000	120.0000	400.0000	20.00000
MAX	28.00000	28.00000	8.000000	101.0000	7.100000	3.700000	120.0000	330.0000	160000.0	4900.000

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	20.80000	-	28.80000	-	-	-	-	-	-	-
NO.	15.00000	-	5.000000	-	-	-	-	-	-	-
MIN	10.00000	-	20.00000	-	-	-	-	-	-	-
MAX	28.00000	-	44.00000	-	-	-	-	-	-	-

APPENDIX VII (Cont.)

STA. 273950 CHICKASAWHAY R. MISS. 63 LEAKESVILLE

SEPTEMBER, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	563.4285	-	-	-	-	-	-	-	-	-
NO.	7.000000	-	-	-	-	-	-	-	-	-
MIN	536.0000	-	-	-	-	-	-	-	-	-
MAX	583.0000	-	-	-	-	-	-	-	-	-

STA. 273980 CHICKASAWHAY R. CO. RD. S.E. KNOBTOWN

JUNE-OCTOBER, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	25.80000	7.240000	87.86666	6.866666	1.633333	73.26666	206.4285	5803.610	119.8982
NO.	-	15.00000	15.00000	15.00000	15.00000	15.00000	15.00000	7.000000	15.00000	15.00000
MIN	-	21.00000	5.500000	70.00000	6.100000	.2000000	32.00000	125.0000	700.0000	20.00000
MAX	-	28.00000	8.200000	102.0000	7.500000	3.200000	103.0000	290.0000	34800.00	3480.000

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	20.26666	80.00000	33.00000	24.00000	-	-	-	-	-	-
NO.	15.00000	1.000000	6.000000	1.000000	-	-	-	-	-	-
MIN	4.000000	80.00000	24.00000	24.00000	-	-	-	-	-	-
MAX	28.00000	80.00000	56.00000	24.00000	-	-	-	-	-	-

STA. 273985 BIG CR. CO. RD. N.W. STATE LINE

JUNE-OCTOBER, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	35.22222	26.43750	7.812500	94.68750	6.443750	1.543750	6.250000	44.28571	4590.652	210.6179
NO.	9.000000	16.00000	16.00000	16.00000	16.00000	16.00000	16.00000	7.000000	16.00000	16.00000
MIN	14.00000	21.00000	5.800000	73.00000	5.700000	.3000000	4.000000	39.00000	460.0000	20.00000
MAX	174.0000	30.00000	8.700000	111.0000	6.900000	2.900000	11.00000	50.00000	348000.0	9000.000

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	11.62500	36.00000	5.666666	28.00000	-	-	-	-	-	-
NO.	16.00000	1.000000	6.000000	1.000000	-	-	-	-	-	-
MIN	6.000000	36.00000	4.000000	28.00000	-	-	-	-	-	-
MAX	18.00000	36.00000	8.000000	28.00000	-	-	-	-	-	-

APPENDIX VII (Cont.)

STA. 274010 BUCATUNNA CR. U.S. 84 S. BUCKATUNNA

JUNE-OCTOBER, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	77.93333	24.37500	7.153333	85.00000	6.660000	1.180000	68.60000	177.8571	5111.435	321.0580
NO.	9.000000	16.00000	15.00000	15.00000	15.00000	15.00000	15.00000	7.000000	16.00000	16.00000
MIN	10.40000	21.00000	6.300000	72.00000	6.000000	.2000000	25.00000	110.0000	1300.000	20.00000
MAX	96.00000	26.00000	8.000000	93.00000	7.100000	2.600000	134.0000	300.0000	160000.0	17200.00

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	18.60000	56.00000	21.00000	26.00000	1400.000	600.0000	-	60.00000	-	-
NO.	15.00000	1.000000	6.000000	1.000000	1.000000	1.000000	-	1.000000	-	-
MIN	6.000000	56.00000	14.00000	26.00000	1400.000	600.0000	-	60.00000	-	-
MAX	28.00000	56.00000	30.00000	26.00000	1400.000	600.0000	-	60.00000	-	-

	R SIDUE TOTAL MG/L	RESIDUE TOT FLT MG/L	RESIDUE TOT NFLT MG/L	ORG N N MG/L	AMMONIA NH3-N MG/L	NITRITE NO2-N MG/L	NITRATE NO3-N MG/L	T PO4 PO4 MG/L	POLY PO4 PO4 MG/L	ORTHOPO4 PO4 MG/L
AVE	240.0000	2.000000	238.0000	.4000000	.2000000	.0000000	2.150000	.0200000	.0000000	.0200000
NO.	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	2.000000	1.000000	1.000000	1.000000
MIN	240.0000	2.000000	238.0000	.4000000	.2000000	.0000000	.1000000	.0200000	.0000000	.0200000
MAX	240.0000	2.000000	238.0000	.4000000	.2000000	.0000000	4.200000	.0200000	.0000000	.0200000

STA. 274105 CHICKASAWHAY R. CO. RD. N.W. BUCKATUNNA

JUNE-OCTOBER, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	25.43750	7.131250	85.81250	6.950000	1.687500	82.62500	224.2857	6301.340	390.6570
NO.	-	16.00000	16.00000	16.00000	16.00000	16.00000	16.00000	7.000000	16.00000	16.00000
MIN	-	21.00000	6.000000	74.00000	6.300000	.5000000	26.00000	155.0000	340.0000	50.00000
MAX	-	28.00000	7.700000	95.00000	7.600000	4.500000	149.0000	300.0000	54200.00	7900.000

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	27.25000	80.00000	41.00000	24.00000	1800.000	1000.000	-	-	-	-
NO.	16.00000	1.000000	6.000000	1.000000	1.000000	1.000000	-	-	-	-
MIN	16.00000	80.00000	28.00000	24.00000	1800.000	1000.000	-	-	-	-
MAX	44.00000	80.00000	56.00000	24.00000	1800.000	1000.000	-	-	-	-

	R SIDUE TOTAL MG/L	RESIDUE TOT FLT MG/L	RESIDUE TOT NFLT MG/L	ORG N N MG/L	AMMONIA NH3-N MG/L	NITRITE NO2-N MG/L	NITRATE NO3-N MG/L	T PO4 PO4 MG/L	POLY PO4 PO4 MG/L	ORTHOPO4 PO4 MG/L
AVE	-	-	-	-	-	-	8.000000	-	-	-
NO.	-	-	-	-	-	-	1.000000	-	-	-
MIN	-	-	-	-	-	-	8.000000	-	-	-
MAX	-	-	-	-	-	-	8.000000	-	-	-

APPENDIX VII (Cont.)

STA. 274120 CHICKASAWHAY R. MISS. 63 S. WAYNESBORO

JUNE-OCTOBER, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	25.68750	7.006250	84.75000	7.037500	1.700000	132.3125	240.0000	8598.442	822.9893
NO.	-	16.00000	16.00000	16.00000	16.00000	14.00000	16.00000	6.000000	16.00000	16.00000
MIN	-	21.00000	3.900000	48.00000	6.200000	.2000000	49.00000	130.0000	490.0000	20.00000
MAX	-	29.00000	8.500000	109.0000	8.100000	4.200000	637.0000	360.0000	253000.0	54200.00

	T ALK ACC3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	30.37500	72.00000	36.66666	18.00000	1300.000	1000.000	-	-	-	-
NO.	16.00000	1.000000	6.000000	1.000000	1.000000	1.000000	-	-	-	-
MIN	16.00000	72.00000	26.00000	18.00000	1300.000	1000.000	-	-	-	-
MAX	46.00000	72.00000	54.00000	18.00000	1300.000	1000.000	-	-	-	-

	RESIDUE TOTAL MG/L	RESIDUE TOT FLT MG/L	RESIDUE TOT NFLT MG/L	ORG N N MG/L	AMMONIA NH3-N MG/L	NITRITE NO2-N MG/L	NITRATE NO3-N MG/L	T PO4 PO4 MG/L	POLY PO4 PO4 MG/L	ORTHOPO4 PO4 MG/L
AVE	-	-	-	-	-	-	4.250000	-	-	-
NO.	-	-	-	-	-	-	2.000000	-	-	-
MIN	-	-	-	-	-	-	1.000000	-	-	-
MAX	-	-	-	-	-	-	7.500000	-	-	-

STA. 274125 CHICKASAWHAY R. U.S. 84 W. WAYNESBORO

JUNE-OCTOBER, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	447.5714	25.06666	6.953333	83.20000	7.060000	1.992857	94.00000	250.8333	6653.527	363.8711
NO.	14.00000	15.00000	15.00000	15.00000	15.00000	14.00000	15.00000	6.000000	15.00000	15.00000
MIN	254.0000	21.00000	4.700000	57.00000	6.400000	.1000000	52.00000	140.0000	330.0000	50.00000
MAX	1025.000	27.00000	8.500000	105.0000	8.500000	7.900000	164.0000	400.0000	92000.00	10900.00

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	28.93333	72.00000	39.00000	20.00000	1400.000	500.5000	-	-	-	-
NO.	15.00000	1.000000	6.000000	1.000000	1.000000	2.000000	-	-	-	-
MIN	16.00000	72.00000	28.00000	20.00000	1400.000	1.000000	-	-	-	-
MAX	48.00000	72.00000	52.00000	20.00000	1400.000	1000.000	-	-	-	-

	RESIDUE TOTAL MG/L	RESIDUE TOT FLT MG/L	RESIDUE TOT NFLT MG/L	ORG N N MG/L	AMMONIA NH3-N MG/L	NITRITE NO2-N MG/L	NITRATE NO3-N MG/L	T PO4 PO4 MG/L	POLY PO4 PO4 MG/L	ORTHOPO4 PO4 MG/L
AVE	439.3333	426.6666	212.6666	.4666666	.2666666	.0030000	1.623333	.3500000	.0166666	.3333333
NO.	3 000000	3.000000	3.000000	3.000000	3.000000	3.000000	6.000000	3.000000	3.000000	3.000000
MIN	260.0000	14.00000	38.00000	.4000000	.2000000	.0000000	.2000000	.3200000	.0000000	.3000000
MAX	724.0000	370.0000	354.0000	.6000000	.4000000	.0090000	7.500000	.3900000	.0300000	.3600000

APPENDIX VII (Cont.)

STA. 274170 SOUINLOVEY CR. W. QUITMAN

JUNE-OCTOBER, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	23.22222	24.00000	7.320000	85.80000	6.935714	1.184615	10.21428	53.75000	2483.686	141.6789
NO.	9.000000	15.00000	15.00000	15.00000	14.00000	13.00000	14.00000	4.000000	15.00000	15.00000
MIN	17.00000	20.00000	6.700000	81.00000	6.300000	.0000000	2.000000	50.00000	700.0000	20.00000
MAX	44.00000	26.00000	7.900000	94.00000	7.400000	4.900000	82.00000	60.00000	7000.000	500.0000

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	38.40000	-	22.80000	-	-	-	-	-	-	-
NO.	15.00000	-	5.000000	-	-	-	-	-	-	-
MIN	28.00000	-	20.00000	-	-	-	-	-	-	-
MAX	50.00000	-	28.00000	-	-	-	-	-	-	-

STA. 274195 CHICKASAWHAY R. MISS. 513 ENTERPRISE

JUNE-OCTOBER, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	140.0937	23.93750	5.300000	61.31250	6.675000	3.628571	8.687500	69.00000	13561.58	1003.963
NO.	16.00000	16.00000	16.00000	16.00000	16.00000	14.00000	16.00000	5.000000	16.00000	16.00000
MIN	84.00000	20.00000	.5000000	6.000000	6.300000	.7000000	6.000000	45.00000	2300.000	200.0000
MAX	383.0000	26.00000	6.900000	82.00000	7.200000	11.20000	12.00000	110.0000	160000.0	13000.00

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	23.25000	38.00000	16.33333	20.00000	-	-	-	-	-	-
NO.	16.00000	1.000000	6.000000	1.000000	-	-	-	-	-	-
MIN	12.00000	38.00000	12.00000	20.00000	-	-	-	-	-	-
MAX	50.00000	38.00000	18.00000	20.00000	-	-	-	-	-	-

	RESIDUE TOTAL MG/L	RESIDUE TOT FLT MG/L	RESIDUE TOT NFLT MG/L	ORG N N MG/L	AMMONIA NH3-N MG/L	NITRITE NO2-N MG/L	NITRATE NO3-N MG/L	T PO4 PO4 MG/L	POLY PO4 PO4 MG/L	ORTHOPO4 PO4 MG/L
AVE	-	-	-	.7000000	1.600000	.0050000	.6725000	.6900000	.0100000	.6800000
NO.	-	-	-	1.000000	1.000000	1.000000	4.000000	1.000000	1.000000	1.000000
MIN	-	-	-	.7000000	1.600000	.0050000	.1000000	.6900000	.0100000	.6800000
MAX	-	-	-	.7000000	1.600000	.0050000	1.500000	.6900000	.0100000	.6800000

APPENDIX VII (Cont.)

STA. 274205 CHUNKY R. U.S. 11 N. ENTERPRISE

JUNE-OCTOBER, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	60.08000	24.12500	7.406250	85.56250	6.653333	1.064285	6.400000	48.75000	5706.318	230.3860
NO.	10.00000	16.00000	16.00000	16.00000	15.00000	14.00000	15.00000	4.000000	16.00000	16.00000
MIN	41.00000	20.00000	6.600000	62.00000	6.200000	.4000000	4.000000	35.00000	940.0000	20.00000
MAX	94.00000	27.00000	8.000000	94.00000	7.100000	2.300000	11.00000	60.00000	34800.00	1700.000

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	15.06666	-	11.80000	-	1300.000	600.0000	-	-	-	-
NO.	15.00000	-	5.000000	-	1.000000	1.000000	-	-	-	-
MIN	10.00000	-	10.00000	-	1300.000	600.0000	-	-	-	-
MAX	24.00000	-	14.00000	-	1300.000	600.0000	-	-	-	-

	RESIDUE TOTAL MG/L	RESIDUE TOT FLT MG/L	RESIDUE TOT NFLT MG/L	ORG N N MG/L	AMMONIA NH3-N MG/L	NITRITE NO2-N MG/L	NITRATE NO3-N MG/L	T PO4 PO4 MG/L	POLY PO4 PO4 MG/L	ORTHOPO4 PO4 MG/L
AVE	103.3333	26.00000	77.33333	.4000000	.3000000	.0060000	1.495000	.1100000	.0100000	.1000000
NO.	3.000000	3.000000	3.000000	1.000000	1.000000	1.000000	4.000000	1.000000	1.000000	1.000000
MIN	102.0000	2.000000	64.00000	.4000000	.3000000	.0060000	.1000000	.1100000	.0100000	.1000000
MAX	104.0000	40.00000	100.0000	.4000000	.3000000	.0060000	4.800000	.1100000	.0100000	.1000000

STA. 274220 TALLAHATTA CR. U.S. 80 W. MERIDIAN

JUNE-OCTOBER, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	23.18750	6.060000	69.66666	6.600000	1.178571	5.133333	48.75000	6968.163	231.3752
NO.	-	16.00000	15.00000	15.00000	15.00000	14.00000	15.00000	4.000000	16.00000	16.00000
MIN	-	20.00000	4.700000	56.00000	6.200000	.1000000	2.000000	40.00000	390.0000	20.00000
MAX	-	25.00000	7.200000	78.00000	7.100000	3.100000	10.00000	55.00000	34800.00	1300.000

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	20.73333	-	16.00000	-	-	-	-	-	-	-
NO.	15.00000	-	6.000000	-	-	-	-	-	-	-
MIN	12.00000	-	14.00000	-	-	-	-	-	-	-
MAX	30.00000	-	24.00000	-	-	-	-	-	-	-

APPENDIX VII (Cont.)

STA. 274240 CHUNKY R. U.S. 80 W. MERIDIAN

JUNE-OCTOBER, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	49.75000	24.12500	7.056250	83.43750	6.668750	1.480000	6.750000	45.00000	3409.359	133.8710
NO.	16.00000	16.00000	16.00000	16.00000	16.00000	15.00000	16.00000	4.000000	16.00000	16.00000
MIN	23.00000	20.00000	5.800000	72.00000	6.100000	.0000000	4.000000	35.00000	330.0000	20.00000
MAX	145.0000	27.00000	7.600000	90.00000	7.500000	7.100000	13.00000	50.00000	160000.0	1300.000

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	21.00000	30.00000	13.00000	14.00000	-	-	-	-	-	-
NO.	16.00000	1.000000	6.000000	1.000000	-	-	-	-	-	-
MIN	14.00000	30.00000	12.00000	14.00000	-	-	-	-	-	-
MAX	38.00000	30.00000	16.00000	14.00000	-	-	-	-	-	-

STA. 274305 OKATIBBEE CR. CO. RD. N.E. ENTERPRISE

JUNE-OCTOBER, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	23.45454	1.933333	24.18181	6.708333	75.20000	14.75000	60.00000	151740.6	44606.05
NO.	-	11.00000	12.00000	11.00000	12.00000	10.00000	12.00000	1.000000	11.00000	11.00000
MIN	-	20.00000	.0000000	.0000000	6.300000	5.600000	5.000000	60.00000	7900.000	490.0000
MAX	-	26.00000	6.400000	78.00000	6.900000	390.0000	26.00000	60.00000	16000000	2400000.

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	42.33333	-	30.00000	-	-	-	-	-	-	-
NO.	12.00000	-	2.000000	-	-	-	-	-	-	-
MIN	16.00000	-	22.00000	-	-	-	-	-	-	-
MAX	70.00000	-	38.00000	-	-	-	-	-	-	-

	RESIDUE TOTAL MG/L	RESIDUE TOT FLT MG/L	RESIDUE TOT NFLT MG/L	ORG N N MG/L	AMMONIA NH3-N MG/L	NITRITE NO2-N MG/L	NITRATE NO3-N MG/L	T PO4 PO4 MG/L	POLY PO4 PO4 MG/L	ORTHOPO4 PO4 MG/L
AVE	-	-	-	-	-	-	1.600000	-	-	-
NO.	-	-	-	-	-	-	1.000000	-	-	-
MIN	-	-	-	-	-	-	1.600000	-	-	-
MAX	-	-	-	-	-	-	1.600000	-	-	-

STA. 274570 LEAF R. U.S. 98 McLAIN

FEBRUARY 24-MARCH 22, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	12.50000	7.768750	71.93750	6.237500	10.60625	13.84375	-	12999.99	1720.000
NO.	-	16.00000	16.00000	16.00000	16.00000	16.00000	16.00000	-	1.000000	1.000000
MIN	-	10.00000	5.700000	56.00000	5.900000	3.300000	5.000000	-	13000.00	1720.000
MAX	-	15.00000	8.900000	80.00000	6.700000	61.00000	32.00000	-	13000.00	1720.000

MARCH 26, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	17.00000	4.400000	45.00000	6.400000	530.0000	35.00000	-	-	-
NO.	-	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	-	-	-
MIN	-	17.00000	4.400000	45.00000	6.400000	530.0000	35.00000	-	-	-
MAX	-	17.00000	4.400000	45.00000	6.400000	530.0000	35.00000	-	-	-

FEBRUARY 24-MARCH 26, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	12.76470	7.570588	70.35294	6.247058	41.15882	15.08823	-	12999.99	1720.000
NO.	-	17.00000	17.00000	17.00000	17.00000	17.00000	17.00000	-	1.000000	1.000000
MIN	-	10.00000	4.400000	45.00000	5.900000	3.300000	5.000000	-	13000.00	1720.000
MAX	-	17.00000	8.900000	80.00000	6.700000	530.0000	35.00000	-	13000.00	1720.000

JUNE-AUGUST, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	1436.466	27.73333	6.833333	86.66666	6.480000	2.907692	45.20000	156.6153	11491.65	616.0199
NO.	15.00000	15.00000	15.00000	15.00000	15.00000	13.00000	15.00000	13.00000	14.00000	14.00000
MIN	720.0000	25.00000	5.900000	73.00000	5.900000	.1000000	10.00000	50.00000	790.0000	20.00000
MAX	2376.000	31.00000	8.300000	107.0000	7.000000	6.500000	191.0000	500.0000	160000.0	7900.000

FEBRUARY 24-MARCH 22, 1965

	00410 T ALK CACO3 MG/L	00900 TOT HARD CACO3 MG/L	00910 CALCIUM CACO3 MG/L	00920 MGNSIUM CACO3 MG/L	01045 IRON TOTAL UG/L	01055 MANGNESE TOTAL UG/L	00070 TURB JKSN JU	00080 COLOR PT-CO UNITS	00335 COD LOWLEVEL MG/L	31677GM STPCOCCI AD-EVA BR-100ML
AVE	16.87500	16.80000	10.93333	5.866666	-	-	-	-	36.95000	-
NO.	16.00000	15.00000	15.00000	15.00000	-	-	-	-	4.000000	-
MIN	8.000000	12.00000	8.000000	.0000000	-	-	-	-	3.800000	-
MAX	48.00000	26.00000	14.00000	12.00000	-	-	.	-	80.00000	-

MARCH 26, 1965

	00410 T ALK CACO3 MG/L	00900 TOT HARD CACO3 MG/L	00910 CALCIUM CACO3 MG/L	00920 MGNSIUM CACO3 MG/L	01045 IRON TOTAL UG/L	01055 MANGNESE TOTAL UG/L	00070 TURB JKSN JU	00080 COLOR PT-CO UNITS	00335 COD LOWLEVEL MG/L	31677GM STPCOCCI AD-EVA BR-100ML
AVE	14.00000	20.00000	14.00000	6.000000	-	-	-	-	-	-
NO.	1.000000	1.000000	1.000000	1.000000	-	-	-	-	-	-
MIN	14.00000	20.00000	14.00000	6.000000	-	-	-	-	-	-
MAX	14.00000	20.00000	14.00000	6.000000	-	-	-	-	-	-

FEBRUARY 24-MARCH 26, 1965

	00410 T ALK CACO3 MG/L	00900 TOT HARD CACO3 MG/L	00910 CALCIUM CACO3 MG/L	00920 MGNSIUM CACO3 MG/L	01045 IRON TOTAL UG/L	01055 MANGNESE TOTAL UG/L	00070 TURB JKSN JU	00080 COLOR PT-CO UNITS	00335 COD LOWLEVEL MG/L	31677GM STPCOCCI AD-EVA BR-100ML
AVE	16.70588	17.00000	11.12500	5.875000	-	-	-	-	36.95000	-
NO.	17.00000	16.00000	16.00000	16.00000	-	-	-	-	4.000000	-
MIN	8.000000	12.00000	8.000000	.0000000	-	-	-	-	3.800000	-
MAX	48.00000	26.00000	14.00000	12.00000	-	-	-	-	80.00000	-

JUNE-AUGUST, 1965

	00410 T ALK CACO3 MG/L	00900 TOT HARD CACO3 MG/L	00910 CALCIUM CACO3 MG/L	00920 MGNSIUM CACO3 MG/L	01045 IRON TOTAL UG/L	01055 MANGNESE TOTAL UG/L	00070 TURB JKSN JU	00080 COLOR PT-CO UNITS	00335 COD LOWLEVEL MG/L	31677GM STPCOCCI AD-EVA BR-100ML
AVE	14.66666	15.66666	9.800000	8.400000	1.700000	.0040000	-	-	-	-
NO.	15.00000	6.000000	10.00000	5.000000	1.000000	1.000000	-	-	-	-
MIN	10.00000	10.00000	6.000000	2.000000	1.700000	.0040000	-	-	-	-
MAX	30.00000	24.00000	16.00000	14.00000	1.700000	.0040000	-	-	-	-

APPENDIX VII (Cont.)

STA. 274570 LEAF R. U.S. 98 McLAIN (Cont.)

JUNE-AUGUST, 1965

	RESIDUE TOTAL MG/L	RESIDUE TOT FLT MG/L	RESIDUE TOT NFLT MG/L	ORG N N MG/L	AMMONIA NH3-N MG/L	NITRITE NO2-N MG/L	NITRATE NO3-N MG/L	T PO4 PO4 MG/L	POLY PO4 PO4 MG/L	ORTHOPO4 PO4 MG/L
AVE	101.0000	54.00000	47.00000	.3000000	.2333333	.0163333	1.416666	.2166666	.0233333	.1933333
NO.	2.000000	2.000000	2.000000	3.000000	3.000000	3.000000	6.000000	3.000000	3.000000	3.000000
MIN	44.00000	19.00000	25.00000	.1000000	.2000000	.0160000	.1000000	.1800000	.0000000	.1300000
MAX	158.0000	89.00000	69.00000	.4000000	.3000000	.0170000	4.600000	.2600000	.0500000	.2400000

STA. 274575 GAINES CR. CO. RD. E. BEAUMONT

MAY-AUGUST, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	28.11111	26.68750	6.400000	79.25000	6.187500	2.506250	6.562500	36.85714	9624.820	1206.893
NO.	9.000000	16.00000	16.00000	16.00000	16.00000	16.00000	16.00000	14.00000	16.00000	16.00000
MIN	4.500000	24.00000	4.400000	56.00000	5.500000	.1000000	2.000000	18.00000	340.0000	20.00000
MAX	183.6000	30.00000	7.000000	88.00000	6.800000	8.000000	14.00000	65.00000	160000.0	24000.00

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	9.187500	11.42857	5.545454	7.000000	-	-	-	-	-	-
NO.	16.00000	7.000000	11.00000	7.000000	-	-	-	-	-	-
MIN	4.000000	6.000000	.0000000	2.000000	-	-	-	-	-	-
MAX	16.00000	16.00000	8.000000	11.00000	-	-	-	-	-	-

	RESIDUE TOTAL MG/L	RESIDUE TOT FLT MG/L	RESIDUE TOT NFLT MG/L	ORG N N MG/L	AMMONIA NH3-N MG/L	NITRITE NO2-N MG/L	NITRATE NO3-N MG/L	T PO4 PO4 MG/L	POLY PO4 PO4 MG/L	ORTHOPO4 PO4 MG/L
AVE	129.0000	78.00000	51.00000	1.000000	.9000000	.0070000	2.400000	.0200000	.0200000	.0000000
NO.	2 000000	2.000000	2.000000	1.000000	1.000000	1.000000	3.000000	1.000000	1.000000	1.000000
MIN	38.00000	30.00000	8.000000	1.000000	.9000000	.0070000	.0000000	.0200000	.0200000	.0000000
MAX	220.0000	126.0000	94.00000	1.000000	.9000000	.0070000	4.400000	.0200000	.0200000	.0000000

STA. 274590 THOMPSON CR. CO. RD. E. HINTONVILLE

MAY-AUGUST, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	30.26666	25.75000	6.687500	81.43750	5.968750	2.043750	9.866666	38.07142	6884.614	223.8985
NO.	9.000000	16.00000	16.00000	16.00000	16.00000	16.00000	15.00000	14.00000	16.00000	16.00000
MIN	12.80000	23.00000	4.400000	56.00000	5.100000	.0000000	5.000000	25.00000	1410.000	20.00000
MAX	73.00000	28.00000	7.800000	96.00000	6.600000	6.600000	16.00000	75.00000	54200.00	3300.000

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	7.400000	9.166666	5.100000	4.166666	-	-	-	-	-	-
NO.	15.00000	6.000000	10.00000	6.000000	-	-	-	-	-	-
MIN	3.000000	7.000000	4.000000	1.000000	-	-	-	-	-	-
MAX	12.00000	10.00000	8.000000	6.000000	-	-	-	-	-	-

APPENDIX VII (Cont.)

STA. 274590 THOMPSON CR. CO. RD. E. HINTONVILLE (Cont.)

MAY-AUGUST, 1965

	RESIDUE TOTAL MG/L	RESIDUE TOT FLT MG/L	RESIDUE TOT NFLT MG/L	ORG N N MG/L	AMMONIA NH3-N MG/L	NITRITE NO2-N MG/L	NITRATE NO3-N MG/L	T PO4 PO4 MG/L	POLY PO4 PO4 MG/L	ORTHOPO4 PO4 MG/L
AVE	229.0000	145.0000	84.00000	1.300000	.9000000	.0120000	1.000000	.0200000	.0200000	.0000000
NO.	2.000000	2.000000	2.000000	1.000000	1.000000	1.000000	3.000000	1.000000	1.000000	1.000000
MIN	58.00000	40.00000	18.00000	1.300000	.9000000	.0120000	.0000000	.0200000	.0200000	.0000000
MAX	400.0000	250.0000	150.0000	1.300000	.9000000	.0120000	1.600000	.0200000	.0200000	.0000000

STA. 274610 LEAF R. MISS. 15 BEAUMONT

FEBRUARY 24-MARCH 22, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCIVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	12.43750	7.840625	72.62500	6.287500	19.00937	14.59375	-	54199.99	54199.99
NO.	-	16.00000	16.00000	16.00000	16.00000	16.00000	16.00000	-	1.000000	1.000000
MIN	-	10.00000	5.900000	58.00000	5.700000	4.100000	5.000000	-	54200.00	54200.00
MAX	-	15.00000	8.900000	82.00000	6.800000	143.0000	38.00000	-	54200.00	54200.00

MARCH 26, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCIVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	17.00000	3.900000	40.00000	6.400000	1293.000	42.00000	-	-	-
NO.	-	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	-	-	-
MIN	-	17.00000	3.900000	40.00000	6.400000	1293.000	42.00000	-	-	-
MAX	-	17.00000	3.900000	40.00000	6.400000	1293.000	42.00000	-	-	-

FEBRUARY 24-MARCH 26, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCIVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	12.70588	7.608823	70.70588	6.294117	93.95000	16.20588	-	54199.99	54199.99
NO.	-	17.00000	17.00000	17.00000	17.00000	17.00000	17.00000	-	1.000000	1.000000
MIN	-	10.00000	3.900000	40.00000	5.700000	4.100000	5.000000	-	54200.00	54200.00
MAX	-	17.00000	8.900000	82.00000	6.800000	1293.000	42.00000	-	54200.00	54200.00

JUNE-AUGUST, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCIVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	1844.142	27.93333	6.133333	77.60000	6.357142	3.060000	72.69230	220.0000	8341.098	1124.476
NO.	7.000000	15.00000	15.00000	15.00000	14.00000	15.00000	13.00000	13.00000	14.00000	14.00000
MIN	1410.000	24.00000	5.100000	62.00000	5.700000	.0000000	12.00000	57.00000	310.0000	50.00000
MAX	2152.000	30.00000	7.400000	97.00000	6.900000	6.600000	264.0000	690.0000	34800.00	9200.000

FEBRUARY 24-MARCH 22, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	16.50000	17.87500	11.62500	6.250000	-	-	-	-	-	-
NO.	16.00000	16.00000	16.00000	16.00000	-	-	-	-	-	-
MIN	10.00000	12.00000	8.000000	4.000000	-	-	-	-	-	-
MAX	48.00000	24.00000	16.00000	12.00000	-	-	-	-	-	-

MARCH 26, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	14.00000	22.00000	16.00000	6.000000	-	-	-	-	-	-
NO.	1.000000	1.000000	1.000000	1.000000	-	-	-	-	-	-
MIN	14.00000	22.00000	16.00000	6.000000	-	-	-	-	-	-
MAX	14.00000	22.00000	16.00000	6.000000	-	-	-	-	-	-

APPENDIX VII (Cont.)

STA. 274610 LEAF R. MISS. 15 BEAUMONT (Cont.)

FEBRUARY 24-MARCH 26, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	16.35294	18.11764	11.88235	6.235294	-	-	-	-	-	-
NO.	17.00000	17.00000	17.00000	17.00000	-	-	-	-	-	-
MIN	10.00000	12.00000	8.000000	4.000000	-	-	-	-	-	-
MAX	48.00000	24.00000	16.00000	12.00000	-	-	-	-	-	-

JUNE-AUGUST, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	13.21428	16.00000	11.25000	7.000000	-	-	-	-	-	-
NO.	14.00000	4.000000	8.000000	4.000000	-	-	-	-	-	-
MIN	10.00000	12.00000	8.000000	4.000000	-	-	-	-	-	-
MAX	16.00000	20.00000	14.00000	10.00000	-	-	-	-	-	-

STA. 274680 LEAF R. CO. RD. N.W. BEAUMONT

FEBRUARY 24-MARCH 22, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	12.00000	8.006250	73.31250	6.187500	16.70333	16.71875	-	54199.99	10900.00
NO.	-	16.00000	16.00000	16.00000	16.00000	15.00000	16.00000	-	1.000000	1.000000
MIN	-	10.00000	6.700000	64.00000	5.900000	3.200000	.0000000	-	54200.00	10900.00
MAX	-	15.00000	9.000000	79.00000	6.400000	58.00000	53.00000	-	54200.00	10900.00

MARCH 26, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	17.00000	4.400000	45.00000	6.400000	1250.000	41.00000	-	-	-
NO.	-	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	-	-	-
MIN	-	17.00000	4.400000	45.00000	6.400000	1250.000	41.00000	-	-	-
MAX	-	17.00000	4.400000	45.00000	6.400000	1250.000	41.00000	-	-	-

FEBRUARY 24-MARCH 2C 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	12.29411	7.794117	71.64705	6.200000	93.78437	18.14705	-	54199.99	10900.00
NO.	-	17.00000	17.00000	17.00000	17.00000	16.00000	17.00000	-	1.000000	1.000000
MIN	-	10.00000	4.400000	45.00000	5.900000	3.200000	.0000000	-	54200.00	10900.00
MAX	-	17.00000	9.000000	79.00000	6.400000	1250.000	33.00000	-	54200.00	10900.00

JUNE-AUGUST, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	28.00000	5.946666	75.26666	6.353333	2.926666	42.80000	160.7692	15453.78	2504.545
NO.	-	15.00000	15.00000	15.00000	15.00000	15.00000	15.00000	13.00000	15.00000	15.00000
MIN	-	25.00000	4.600000	57.00000	5.800000	.1000000	7.000000	39.00000	2300.000	170.0000
MAX	-	31.00000	7.800000	104.0000	7.000000	5.700000	115.0000	400.0000	348000.0	348000.0

FEBRUARY 24-MARCH 22, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	14.43750	17.62500	11.18750	6.687500	-	-	-	-	-	-
NO.	16.00000	16.00000	16.00000	16.00000	-	-	-	-	-	-
MIN	8.000000	12.00000	8.000000	2.000000	-	-	-	-	-	-
MAX	44.00000	22.00000	16.00000	16.00000	-	-	-	-	-	-

STA. 274680 LEAF R. CO. RD. N.W. BEAUMONT (Cont.)

MARCH 26, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	14.00000	22.00000	15.00000	7.000000	-	-	-	-	-	-
NO.	1.000000	1.000000	1.000000	1.000000	-	-	-	-	-	-
MIN	14.00000	22.00000	15.00000	7.000000	-	-	-	-	-	-
MAX	14.00000	22.00000	15.00000	7.000000	-	-	-	-	-	-

FEBRUARY 24-MARCH 26, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	14.41176	17.88235	11.41176	6.705882	-	-	-	-	-	-
NO.	17.00000	17.00000	17.00000	17.00000	-	-	-	-	-	-
MIN	8.000000	12.00000	8.000000	2.000000	-	-	-	-	-	-
MAX	44.00000	22.00000	16.00000	16.00000	-	-	-	-	-	-

JUNE-AUGUST, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	12.40000	14.50000	10.00000	4.833333	-	-	-	-	-	-
NO.	15.00000	6.000000	10.00000	6.000000	-	-	-	-	-	-
MIN	8.000000	10.00000	4.000000	4.000000	-	-	-	-	-	-
MAX	18.00000	18.00000	14.00000	6.000000	-	-	-	-	-	-

STA. 274683 BOGUE HOMO CR. CO. RD. N.W. BEAUMONT

MAY-AUGUST, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	107.0000	27.31250	7.333333	91.66666	6.442857	2.312500	41.00000	150.9285	9042.103	722.0262
NO.	9.000000	16.00000	15.00000	15.00000	14.00000	16.00000	14.00000	14.00000	16.00000	16.00000
MIN	30.50000	25.00000	5.100000	61.00000	5.900000	.5000000	6.000000	35.00000	790.0000	40.00000
MAX	244.0000	30.00000	8.100000	102.0000	6.900000	7.200000	71.00000	250.0000	160000.0	17200.00

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	11.06666	27.60000	18.00000	9.200000	-	-	-	-	-	-
NO.	15.00000	5.000000	9.000000	5.000000	-	-	-	-	-	-
MIN	6.000000	8.000000	6.000000	2.000000	-	-	-	-	-	-
MAX	16.00000	34.00000	24.00000	12.00000	-	-	-	-	-	-

	RESIDUE TOTAL MG/L	RESIDUE TOT FLT MG/L	RESIDUE TOT NFLT MG/L	ORG N N MG/L	AMMONIA NH3-N MG/L	NITRITE NO2-N MG/L	NITRATE NO3-N MG/L	T PO4 PO4 MG/L	POLY PO4 PO4 MG/L	ORTHOPO4 PO4 MG/L
AVE	143.0000	43.50000	99.50000	.3000000	.2000000	.0140000	1.566666	.0200000	.0000000	.0200000
NO.	2.000000	2.000000	2.000000	1.000000	1.000000	1.000000	3.000000	1.000000	1.000000	1.000000
MIN	120.0000	10.00000	43.00000	.3000000	.2000000	.0140000	.1000000	.0200000	.0000000	.0200000
MAX	166.0000	77.00000	156.0000	.3000000	.2000000	.0140000	3.400000	.0200000	.0000000	.0200000

APPENDIX VII (Cont.)

STA. 274690 LEAF R. MISS. 29 N.W. NEW AUGUSTA

JUNE-AUGUST, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	28.33333	5.953333	75.60000	6.380000	3.600000	57.42857	183.8461	38666.63	7938.413
NO.	-	15.00000	15.00000	15.00000	15.00000	11.00000	14.00000	13.00000	15.00000	15.00000
MIN	-	25.00000	4.100000	50.00000	5.800000	.7000000	8.000000	41.00000	2780.000	230.0000
MAX	-	31.00000	8.200000	108.0000	7.100000	6.700000	197.0000	580.0000	348000.0	130000.0

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	12.40000	14.20000	10.00000	5.000000	-	-	-	-	-	-
NO.	15.00000	5.000000	9.000000	5.000000	-	-	-	-	-	-
MIN	9.000000	12.00000	6.000000	4.000000	-	-	-	-	-	-
MAX	16.00000	18.00000	14.00000	7.000000	-	-	-	-	-	-

STA. 274702 TALLAHALA CR. CO. RD. ABOVE MOUTH

FEBRUARY 24-MARCH 22, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	1864.500	11.87500	6.015625	54.75000	5.981250	95.13846	11.84375	-	57746.16	5589.622
NO.	16.00000	16.00000	16.00000	16.00000	16.00000	13.00000	16.00000	-	15.00000	15.00000
MIN	856.0000	9.000000	3.900000	38.00000	5.300000	6.600000	3.000000	-	7900.000	120.0000
MAX	2920.000	15.00000	7.700000	74.00000	6.400000	397.0000	31.00000	-	348000.0	49000.00

MARCH 26, 1965

AVE	764.0000	17.00000	1.400000	14.00000	6.300000	2160.000	10.00000	-	34799.99	1099.999
NO.	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	-	1.000000	1.000000
MIN	764.0000	17.00000	1.400000	14.00000	6.300000	2160.000	10.00000	-	34800.00	1100.000
MAX	764.0000	17.00000	1.400000	14.00000	6.300000	2160.000	10.00000	-	34800.00	1100.000

FEBRUARY 24-MARCH 26, 1965

AVE	1799.764	12.17647	5.744117	52.35294	6.000000	242.6285	11.73529	-	55946.98	5049.613
NO.	17.00000	17.00000	17.00000	17.00000	17.00000	14.00000	17.00000	-	16.00000	16.00000
MIN	764.0000	9.000000	1.400000	14.00000	5.300000	6.600000	3.000000	-	7900.000	120.0000
MAX	2920.000	17.00000	7.700000	74.00000	6.400000	2160.000	31.00000	-	348000.0	49000.00

JUNE-AUGUST, 1965

AVE	233.5107	28.10000	5.763333	73.03333	6.741379	4.848275	21.72413	115.9629	15884.42	979.4305
NO.	28.00000	30.00000	30.00000	30.00000	29.00000	29.00000	29.00000	27.00000	29.00000	28.00000
MIN	98.00000	24.00000	2.200000	27.00000	5.500000	1.300000	8.000000	59.00000	490.0000	40.00000
MAX	538.0000	31.00000	8.700000	114.0000	7.400000	27.00000	60.00000	215.0000	542000.0	172000.0

STA. 274702 TALLAHALA CR. CO. RD. ABOVE MOUTH (Cont.)

FEBRUARY 24-MARCH 22, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	13.37500	19.75000	12.12500	12.12500	-	-	-	-	-	919.9999
NO.	16.00000	16.00000	16.00000	16.00000	-	-	-	-	-	1.000000
MIN	8.000000	12.00000	8.000000	2.000000	-	-	-	-	-	920.0000
MAX	20.00000	30.00000	18.00000	80.00000	-	-	-	-	-	920.0000

MARCH 26, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	16.00000	26.00000	18.00000	8.000000	-	-	-	-	-	199.9999
NO.	1.000000	1.000000	1.000000	1.000000	-	-	-	-	-	1.000000
MIN	16.00000	26.00000	18.00000	8.000000	-	-	-	-	-	200.0000
MAX	16.00000	26.00000	18.00000	8.000000	-	-	-	-	-	200.0000

FEBRUARY 24-MARCH 26, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	13.52941	20.11764	12.47058	11.88235	-	-	-	-	-	428.9522
NO.	17.00000	17.00000	17.00000	17.00000	-	-	-	-	-	2.000000
MIN	8.000000	12.00000	8.000000	2.000000	-	-	-	-	-	200.0000
MAX	20.00000	30.00000	18.00000	80.00000	-	-	-	-	-	920.0000

JUNE-AUGUST, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	26.79310	20.75000	12.31578	9.166666	-	-	-	-	-	-
NO.	29.00000	12.00000	19.00000	12.00000	-	-	-	-	-	-
MIN	12.00000	14.00000	8.000000	4.000000	-	-	-	-	-	-
MAX	48.00000	32.00000	17.00000	20.00000	-	-	-	-	-	-

JUNE-AUGUST, 1965

	RESIDUE TOTAL MG/L	RESIDUE TOT FLT MG/L	RESIDUE TOT NFLT MG/L	ORG N N MG/L	AMMONIA NH3-N MG/L	NITRITE NO2-N MG/L	NITRATE NO3-N MG/L	T PO4 PO4 MG/L	POLY PO4 PO4 MG/L	ORTHOPO4 PO4 MG/L
AVE	145.0000	9.000000	138.0000	.7000000	.3500000	.0195000	1.800000	.3200000	.3400000	.2500000
NO.	2.000000	2.000000	2.000000	2.000000	2.000000	2.000000	4.000000	2.000000	2.000000	2.000000
MIN	90.00000	8.000000	80.00000	.6000000	.3000000	.0190000	.1000000	.3200000	.0800000	.2400000
MAX	200.0000	10.00000	196.0000	.8000000	.4000000	.0200000	4.000000	.3200000	.6000000	.2600000

STA. 274730 TALLAHALA CR. CO. RD. S. RUNNELSTOWN

FEBRUARY 24-MARCH 22, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	1952.375	11.56250	5.286666	47.93333	5.933333	75.30000	14.43333	-	47999.14	5150.103
NO.	16.00000	16.00000	15.00000	15.00000	15.00000	13.00000	15.00000	-	16.00000	15.00000
MIN	824.0000	9.000000	3.500000	34.00000	5.300000	5.900000	3.000000	-	17200.00	330.0000
MAX	3210.000	14.00000	7.200000	67.00000	6.300000	181.0000	56.00000	-	160000.0	24000.00

MARCH 26, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	724.0000	17.00000	.1000000	1.000000	6.200000	2220.000	14.00000	-	24000.00	1299.999
NO.	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	-	1.000000	1.000000
MIN	724.0000	17.00000	.1000000	1.000000	6.200000	2220.000	14.00000	-	24000.00	1300.000
MAX	724.0000	17.00000	.1000000	1.000000	6.200000	2220.000	14.00000	-	24000.00	1300.000

STA. 274730 TALLAHALA CR. CO. RD. S. RUNNELSTOWN (Cont.)

FEBRUARY 24-MARCH 26, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	1880.117	11.88235	4.962500	45.00000	5.950000	228.4928	14.40625	-	46081.47	4725.512
NO.	17.00000	17.00000	16.00000	16.00000	16.00000	14.00000	16.00000	-	17.00000	16.00000
MIN	724.0000	9.000000	.1000000	1.000000	5.300000	5.900000	3.000000	-	17200.00	330.0000
MAX	3210.000	17.00000	7.200000	67.00000	6.300000	2220.000	56.00000	-	160000.0	24000.00

JUNE-JULY, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	139.6888	27.50000	2.880000	36.40000	6.830000	19.02000	25.30000	139.3333	18635.23	2566.696
NO.	9.000000	10.00000	10.00000	10.00000	10.00000	10.00000	10.00000	9.000000	10.00000	10.00000
MIN	78.50000	24.00000	.0000000	.0000000	6.400000	3.200000	10.00000	70.00000	230.0000	170.0000
MAX	306.0000	30.00000	7.000000	90.00000	7.200000	63.00000	41.00000	210.0000	3480000.	34800.00

FEBRUARY 24-MARCH 22, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	13.93333	21.60000	13.20000	8.400000	-	-	-	-	-	-
NO.	15.00000	15.00000	15.00000	15.00000	-	-	-	-	-	-
MIN	6.000000	18.00000	10.00000	4.000000	-	-	-	-	-	-
MAX	26.00000	28.00000	18.00000	12.00000	-	-	-	-	-	-

MARCH 26 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	16.00000	30.00000	17.00000	13.00000	-	-	-	-	-	-
NO.	1.000000	1.000000	1.000000	1.000000	-	-	-	-	-	-
MIN	16.00000	30.00000	17.00000	13.00000	-	-	-	-	-	-
MAX	16.00000	30.00000	17.00000	13.00000	-	-	-	-	-	-

FEBRUARY 24-MARCH 26, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	14.06250	22.12500	13.43750	8.687500	-	-	-	-	-	-
NO.	16.00000	16.00000	16.00000	16.00000	-	-	-	-	-	-
MIN	6.000000	18.00000	10.00000	4.000000	-	-	-	-	-	-
MAX	26.00000	30.00000	18.00000	13.00000	-	-	-	-	-	-

JUNE-JULY, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	35.00000	22.33333	15.80000	9.000000	-	-	-	-	-	-
NO.	10.00000	6.000000	10.00000	6.000000	-	-	-	-	-	-
MIN	20.00000	16.00000	10.00000	6.000000	-	-	-	-	-	-
MAX	64.00000	30.00000	28.00000	14.00000	-	-	-	-	-	-

MARCH 22, 1965

	R SIDUE TOTAL MG/L	RESIDUE TOT FLT MG/L	RESIDUE TOT NFLT MG/L	ORG N N MG/L	AMMONIA NH3-N MG/L	NITRITE NO2-N MG/L	NITRATE NO3-N MG/L	T PO4 PO4 MG/L	POLY PO4 PO4 MG/L	ORTHOPO4 PO4 MG/L
AVE	367.5000	215.0000	152.5000	-	-	-	-	-	-	-
NO.	1.000000	1.000000	1.000000	-	-	-	-	-	-	-
MIN	367.5000	215.0000	152.5000	-	-	-	-	-	-	-
MAX	367.5000	215.0000	152.5000	-	-	-	-	-	-	-

APPENDIX VII (Cont.)

STA. 274740 TALLAHAHA CR. CO. RD. E. MARRISTON

FEBRUARY 24-MARCH 22, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	11.62500	4.956250	45.25000	5.825000	100.9923	16.15625	-	35882.26	6538.927
NO.	-	16.00000	16.00000	16.00000	16.00000	13.00000	16.00000	-	16.00000	15.00000
MIN	-	9.000000	2.600000	25.00000	5.100000	6.100000	3.000000	-	4900.000	1090.000
MAX	-	15.00000	6.700000	62.00000	6.400000	271.0000	65.00000	-	160000.0	34800.00

MARCH 26, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	17.00000	.0000000	.0000000	6.500000	2220.000	126.0000	-	159999.9	7899.999
NO.	-	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	-	1.000000	1.000000
MIN	-	17.00000	.0000000	.0000000	6.500000	2220.000	126.0000	-	160000.0	7900.000
MAX	-	17.00000	.0000000	.0000000	6.500000	2220.000	126.0000	-	160000.0	7900.000

FEBRUARY 24-MARCH 26, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	11.94117	4.664705	42.58823	5.864705	252.3500	22.61764	-	39180.54	6616.663
NO.	-	17.00000	17.00000	17.00000	17.00000	14.00000	17.00000	-	17.00000	16.00000
MIN	-	9.000000	.0000000	.0000000	5.100000	6.100000	3.000000	-	4900.000	1090.000
MAX	-	17.00000	6.700000	62.00000	6.500000	2220.000	126.0000	-	160000.0	34800.00

JUNE-JULY, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	27.40000	1.520000	19.15000	6.920000	27.09000	32.77777	170.7500	25420.57	8819.385
NO.	-	10.00000	10.00000	10.00000	10.00000	10.00000	9.000000	8.000000	10.00000	10.00000
MIN	-	25.00000	.0000000	.0000000	6.500000	2.400000	5.000000	56.00000	5000.000	2000.000
MAX	-	29.00000	3.700000	47.00000	7.700000	84.00000	48.00000	240.0000	240000.0	230000.0

FEBRUARY 24-MARCH 22, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	13.62500	24.37500	14.12500	10.25000	-	-	-	-	19.82500	-
NO.	16.00000	16.00000	16.00000	16.00000	-	-	-	-	4.000000	-
MIN	7.000000	12.00000	8.000000	.0000000	-	-	-	-	13.90000	-
MAX	22.00000	48.00000	20.00000	34.00000	-	-	-	-	23.40000	-

MARCH 26, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	18.00000	62.00000	20.00000	42.00000	-	-	-	-	-	-
NO.	1.000000	1.000000	1.000000	1.000000	-	-	-	-	-	-
MIN	18.00000	62.00000	20.00000	42.00000	-	-	-	-	-	-
MAX	18.00000	62.00000	20.00000	42.00000	-	-	-	-	-	-

FEBRUARY 24-MARCH 26, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	13.88235	26.58823	14.47058	12.11764	-	-	-	-	19.82500	-
NO.	17.00000	17.00000	17.00000	17.00000	-	-	-	-	4.000000	-
MIN	7.000000	12.00000	8.000000	.0000000	-	-	-	-	13.90000	-
MAX	22.00000	62.00000	20.00000	42.00000	-	-	-	-	23.40000	-

JUNE-JULY, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	40.60000	28.60000	16.55555	12.80000	-	-	-	-	-	-
NO.	10.00000	5.000000	9.000000	5.000000	-	-	-	-	-	-
MIN	16.00000	15.00000	12.00000	.0000000	-	-	-	-	-	-
MAX	74.00000	54.00000	22.00000	34.00000	-	-	-	-	-	-

APPENDIX VII (Cont.)

STA. 274750 TALLAHALA CR. CO. RD. W. OVETT

FEBRUARY 24-MARCH 22, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	1670.533	12.62500	5.093333	47.33333	5.780000	119.3636	12.43333	-	59017.86	6213.929
NO.	15.00000	16.00000	15.00000	15.00000	15.00000	11.00000	15.00000	-	14.00000	14.00000
MIN	840.0000	10.00000	2.900000	26.00000	5.200000	39.00000	1.000000	-	17200.00	60.00000
MAX	2721.000	16.00000	6.700000	62.00000	6.300000	330.0000	34.00000	-	160000.0	34800.00

MARCH 26, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	783.0000	16.00000	.3000000	3.000000	6.200000	216.0000	17.00000	-	159999.9	12999.99
NO.	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	-	1.000000	1.000000
MIN	783.0000	16.00000	.3000000	3.000000	6.200000	216.0000	17.00000	-	160000.0	13000.00
MAX	783.0000	16.00000	.3000000	3.000000	6.200000	216.0000	17.00000	-	160000.0	13000.00

FEBRUARY 24-MARCH 26, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	1615.062	12.82352	4.793750	44.56250	5.806250	127.4166	12.71875	-	63075.28	6527.367
NO.	16.00000	17.00000	16.00000	16.00000	16.00000	12.00000	16.00000	-	15.00000	15.00000
MIN	783.0000	10.00000	.3000000	3.000000	5.200000	39.00000	1.000000	-	17200.00	60.00000
MAX	2721.000	16.00000	6.700000	62.00000	6.300000	330.0000	34.00000	-	160000.0	34800.00

JUNE-JULY, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	154.1428	27.30000	1.530000	19.40000	6.980000	18.55555	35.40000	184.2222	30471.07	11618.10
NO.	7.000000	10.00000	10.00000	10.00000	10.00000	9.000000	10.00000	9.000000	10.00000	10.00000
MIN	51.00000	25.00000	.0000000	.0000000	6.500000	4.500000	5.000000	58.00000	330.0000	170.0000
MAX	348.0000	30.00000	3.300000	41.00000	7.500000	63.00000	53.00000	250.0000	1300000.	230000.0

FEBRUARY 24-MARCH 22, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	16.26666	22.93333	14.53333	8.400000	-	-	-	-	-	175.0000
NO.	15.00000	15.00000	15.00000	15.00000	-	-	-	-	-	1.000000
MIN	6.000000	14.00000	10.00000	4.000000	-	-	-	-	-	175.0000
MAX	28.00000	34.00000	20.00000	14.00000	-	-	-	-	-	175.0000

MARCH 26, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	24.00000	30.00000	24.00000	6.000000	-	-	-	-	-	541.9999
NO.	1.000000	1.000000	1.000000	1.000000	-	-	-	-	-	1.000000
MIN	24.00000	30.00000	24.00000	6.000000	-	-	-	-	-	542.0000
MAX	24.00000	30.00000	24.00000	6.000000	-	-	-	-	-	542.0000

FEBRUARY 24-MARCH 26, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	16.75000	23.37500	15.12500	8.250000	-	-	-	-	-	307.9772
NO.	16.00000	16.00000	16.00000	16.00000	-	-	-	-	-	2.000000
MIN	6.000000	14.00000	10.00000	4.000000	-	-	-	-	-	175.0000
MAX	28.00000	34.00000	24.00000	14.00000	-	-	-	-	-	542.0000

JUNE-JULY, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	48.60000	29.00000	17.80000	12.00000	-	-	-	-	-	-
NO.	10.00000	5.000000	10.00000	5.000000	-	-	-	-	-	-
MIN	18.00000	18.00000	10.00000	8.000000	-	-	-	-	-	-
MAX	84.00000	34.00000	26.00000	18.00000	-	-	-	-	-	-

APPENDIX VII (Cont.)

STA. 274750 TALLAHALA CR. CO. RD. W. OVETT (Cont.)

JULY-AUGUST, 1965

	RESIDUE TOTAL MG/L	RESIDUE TOT FLT MG/L	RESIDUE TOT NFLT MG/L	ORG N N MG/L	AMMONIA NH3-N MG/L	NITRITE NO2-N MG/L	NITRATE NO3-N MG/L	T PO4 PO4 MG/L	POLY PO4 PO4 MG/L	ORTHOPO4 PO4 MG/L
AVE	172.0000	22.00000	150.0000	-	-	-	2.666666	-	-	-
NO.	2.000000	2.000000	2.000000	-	-	-	3.000000	-	-	-
MIN	166.0000	15.00000	137.0000	-	-	-	1.800000	-	-	-
MAX	178.0000	29.00000	163.0000	-	-	-	3.200000	-	-	-

STA. 274795 TALLAHALA CR. CO. RD. E. ELLISVILLE

FEBRUARY 23-MARCH 22, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	2324.666	12.56250	6.312500	59.25000	5.506666	134.1250	83.71875	-	65800.69	8175.568
NO.	15.00000	16.00000	16.00000	16.00000	15.00000	12.00000	16.00000	-	16.00000	16.00000
MIN	1500.000	10.00000	4.700000	44.00000	4.700000	10.00000	1.000000	-	5000.000	241.0000
MAX	3000.000	16.00000	7.900000	78.00000	6.500000	361.0000	1117.000	-	1600000.	160000.0

MARCH 26, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	1360.000	16.00000	2.700000	27.00000	6.100000	446.0000	24.00000	-	159999.9	91999.99
NO.	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	-	1.000000	1.000000
MIN	1360.000	16.00000	2.700000	27.00000	6.100000	446.0000	24.00000	-	160000.0	92000.00
MAX	1360.000	16.00000	2.700000	27.00000	6.100000	446.0000	24.00000	-	160000.0	92000.00

FEBRUARY 23-MARCH 26, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	2264.375	12.76470	6.100000	57.35294	5.543750	158.1153	80.20588	-	69331.38	9426.649
NO.	16.00000	17.00000	17.00000	17.00000	16.00000	13.00000	17.00000	-	17.00000	17.00000
MIN	1360.000	10.00000	2.700000	27.00000	4.700000	10.00000	1.000000	-	5000.000	241.0000
MAX	3000.000	16.00000	7.900000	78.00000	6.500000	446.0000	1117.000	-	1600000.	160000.0

JUNE-JULY, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	27.60000	.5700000	7.200000	6.650000	51.00000	42.77777	250.0000	3904239.	1772853.
NO.	-	10.00000	10.00000	10.00000	10.00000	8.000000	9.000000	8.000000	9.000000	9.000000
MIN	-	26.00000	.0000000	.0000000	6.400000	12.90000	5.000000	90.00000	330000.0	170000.0
MAX	-	30.00000	3.400000	43.00000	7.000000	126.0000	83.00000	400.0000	16000000	16000000

FEBRUARY 23-MARCH 22, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	14.40000	24.50000	16.00000	8.500000	-	-	-	-	106.8500	-
NO.	15.00000	16.00000	16.00000	16.00000	-	-	-	-	4.000000	-
MIN	2.000000	16.00000	12.00000	.0000000	-	-	-	-	14.40000	-
MAX	28.00000	38.00000	26.00000	24.00000	-	-	-	-	179.0000	-

MARCH 26, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	26.00000	36.00000	22.00000	14.00000	-	-	-	-	-	-
NO.	1.000000	1.000000	1.000000	1.000000	-	-	-	-	-	-
MIN	26.00000	36.00000	22.00000	14.00000	-	-	-	-	-	-
MAX	26.00000	36.00000	22.00000	14.00000	-	-	-	-	-	-

APPENDIX VII (Cont.)

STA. 274795 TALLAHALA CR. CO. RD. E. ELLISVILLE (Cont.)

FEBRUARY 23-MARCH 26, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	15.12500	25.17647	16.35294	8.823529	-	-	-	-	106.8500	-
NO.	16.00000	17.00000	17.00000	17.00000	-	-	-	-	4.000000	-
MIN	2.000000	16.00000	12.00000	.0000000	-	-	-	-	14.40000	-
MAX	28.00000	38.00000	26.00000	24.00000	-	-	-	-	179.0000	-

JUNE-JULY, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	52.80000	31.50000	26.55555	13.75000	-	-	-	-	-	-
NO.	10.00000	4.000000	9.000000	4.000000	-	-	-	-	-	-
MIN	16.00000	20.00000	14.00000	6.000000	-	-	-	-	-	-
MAX	90.00000	44.00000	48.00000	24.00000	-	-	-	-	-	-

MARCH 22, 1965

	RESIDUE TOTAL MG/L	RESIDUE TOT FLT MG/L	RESIDUE TOT NFLT MG/L	ORG N N MG/L	AMMONIA NH3-N MG/L	NITRITE NO2-N MG/L	NITRATE NO3-N MG/L	T PO4 PO4 MG/L	POLY PO4 PO4 MG/L	ORTHOPO4 PO4 MG/L
AVE	466.5000	225.5000	-	-	-	-	-	-	-	-
NO.	1.000000	1.000000	-	-	-	-	-	-	-	-
MIN	466.5000	225.5000	-	-	-	-	-	-	-	-
MAX	466.5000	225.5000	-	-	-	-	-	-	-	-

STA. 274830 TALLAHALA CR. CO. RD. S. LAUREL

FEBRUARY 23-MARCH 22, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	692.1333	12.03125	6.646666	61.46666	5.275000	219.2727	39.84375	-	104170.3	23045.60
NO.	15.00000	16.00000	15.00000	15.00000	16.00000	11.00000	16.00000	-	14.00000	13.00000
MIN	230.0000	10.00000	5.000000	46.00000	3.800000	66.00000	6.500000	-	13000.00	3300.000
MAX	1200.000	15.50000	8.300000	80.00000	6.700000	344.0000	319.0000	-	920000.0	160000.0

MARCH 26, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	437.0000	16.00000	3.200000	32.00000	5.100000	440.0000	32.00000	-	159999.9	27799.99
NO.	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	-	1.000000	1.000000
MIN	437.0000	16.00000	3.200000	32.00000	5.100000	440.0000	32.00000	-	160000.0	27800.00
MAX	437.0000	16.00000	3.200000	32.00000	5.100000	440.0000	32.00000	-	160000.0	27800.00

FEBRUARY 23-MARCH 26, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	676.1875	12.26470	6.431250	59.62500	5.264705	237.6666	39.38235	-	107193.6	23356.42
NO.	16.00000	17.00000	16.00000	16.00000	17.00000	12.00000	17.00000	-	15.00000	14.00000
MIN	230.0000	10.00000	3.200000	32.00000	3.800000	66.00000	6.500000	-	13000.00	3300.000
MAX	1200.000	16.00000	8.300000	80.00000	6.700000	440.0000	319.0000	-	920000.0	160000.0

JUNE-AUGUST, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	48.57894	27.75000	.0933333	1.133333	6.533333	90.69411	46.86666	295.7142	8276981.	2710053.
NO.	19.00000	20.00000	15.00000	15.00000	15.00000	17.00000	15.00000	14.00000	14.00000	14.00000
MIN	24.00000	26.00000	.0000000	.0000000	4.800000	25.20000	7.000000	50.00000	7600.000	490.0000
MAX	88.00000	31.00000	.9000000	11.00000	9.100000	300.0000	102.0000	600.0000	99990000	99990000

APPENDIX VII (Cont.)

STA. 274830 TALLAHALA CR. CO. RD. S. LAUREL (Cont.)

FEBRUARY 23-MARCH 22, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	11.06666	32.12500	21.62500	10.50000	-	-	-	-	190.2500	15999.99
NO.	15.00000	16.00000	16.00000	16.00000	-	-	-	-	4.000000	1.000000
MIN	.0000000	22.00000	16.00000	4.000000	-	-	-	-	25.00000	16000.00
MAX	26.00000	42.00000	30.00000	18.00000	-	-	-	-	272.0000	16000.00

MARCH 26, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	14.00000	42.00000	30.00000	12.00000	-	-	-	-	-	54199.99
NO.	1.000000	1.000000	1.000000	1.000000	-	-	-	-	-	1.000000
MIN	14.00000	42.00000	30.00000	12.00000	-	-	-	-	-	54200.00
MAX	14.00000	42.00000	30.00000	12.00000	-	-	-	-	-	54200.00

FEBRUARY 23-MARCH 26, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	11.25000	32.70588	22.11764	10.58823	-	-	-	-	190.2500	29448.25
NO.	16.00000	17.00000	17.00000	17.00000	-	-	-	-	4.000000	2.000000
MIN	.0000000	22.00000	16.00000	4.000000	-	-	-	-	25.00000	16000.00
MAX	26.00000	42.00000	30.00000	18.00000	-	-	-	-	272.0000	54200.00

JUNE-AUGUST, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	70.93333	36.00000	30.70000	15.00000	-	-	-	-	-	-
NO.	15.00000	5.000000	10.00000	5.000000	-	-	-	-	-	-
MIN	8.000000	22.00000	14.00000	8.000000	-	-	-	-	-	-
MAX	232.0000	52.00000	60.00000	26.00000	-	-	-	-	-	-

MARCH 22, 1965

	TOTAL MG/L	TOT FLT MG/L	TOT NFLT MG/L	N MG/L	NH3-N MG/L	NO2-N MG/L	NO3-N MG/L	PO4 MG/L	PO4 MG/L	PO4 MG/L
AVE	652.5000	260.0000	392.5000	-	-	-	-	-	-	-
NO.	1.000000	1.000000	1.000000	-	-	-	-	-	-	-
MIN	652.5000	260.0000	392.5000	-	-	-	-	-	-	-
MAX	652.5000	260.0000	392.5000	-	-	-	-	-	-	-

JUNE-AUGUST, 1965

	TOTAL MG/L	TOT FLT MG/L	TOT NFLT MG/L	N MG/L	NH3-N MG/L	NO2-N MG/L	NO3-N MG/L	PO4 MG/L	PO4 MG/L	PO4 MG/L
AVE	313.3333	54.33333	259.0000	-	-	-	-	-	-	-
NO.	3.000000	3.000000	3.000000	-	-	-	-	-	-	-
MIN	200.0000	12.00000	188.0000	-	-	-	-	-	-	-
MAX	402.0000	110.0000	297.0000	-	-	-	-	-	-	-

STA. 274850 TALLAHALA CR. MISS. 15 LAUREL

FEBRUARY 23-MARCH 22, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	716.5000	11.75000	9.712500	88.86666	6.186666	2.733333	150.2812	-	54560.17	20041.73
NO.	16.00000	16.00000	16.00000	15.00000	15.00000	12.00000	16.00000	-	16.00000	15.00000
MIN	277.0000	10.00000	8.300000	80.00000	4.500000	1.400000	6.000000	-	14100.00	2400.000
MAX	1198.000	15.00000	11.20000	104.0000	6.800000	4.400000	2075.000	-	160000.0	160000.0

APPENDIX VII (Cont.)

STA. 274850 TALLAHALA CR. MISS. 15 LAUREL (Cont.)

MARCH 26, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	250.0000	17.00000	7.900000	79.00000	6.600000	-	59.00000	-	159999.9	24000.00
NO.	1.000000	1.000000	1.000000	1.000000	1.000000	-	1.000000	-	1.000000	1.000000
MIN	250.0000	17.00000	7.900000	79.00000	6.600000	-	59.00000	-	160000.0	24000.00
MAX	250.0000	17.00000	7.900000	79.00000	6.600000	-	59.00000	-	160000.0	24000.00

FEBRUARY 23-MARCH 26, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	689.0588	12.05882	9.605882	88.25000	6.212500	2.733333	144.9117	-	58124.70	20268.77
NO.	17.00000	17.00000	17.00000	16.00000	16.00000	12.00000	17.00000	-	17.00000	16.00000
MIN	250.0000	10.00000	7.900000	79.00000	4.500000	1.400000	6.000000	-	14100.00	2400.000
MAX	1198.000	17.00000	11.20000	104.0000	6.800000	4.400000	2075.000	-	160000.0	160000.0

JUNE-AUGUST, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	21.25500	26.25000	4.080000	60.53333	6.640000	4.095238	66.00000	238.6666	13353.58	894.8205
NO.	20.00000	20.00000	15.00000	15.00000	15.00000	21.00000	15.00000	15.00000	15.00000	15.00000
MIN	9.000000	24.00000	3.100000	38.00000	6.100000	.2000000	27.00000	99.00000	130.0000	.0000000
MAX	54.00000	29.00000	6.900000	82.00000	7.000000	17.00000	122.0000	400.0000	330000.0	130000.0

FEBRUARY 23-MARCH 22, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STRCOCCI AD-EVA BR-100ML
AVE	18.53333	26.93750	18.50000	8.562500	-	-	-	-	-	-
NO.	15.00000	16.00000	16.00000	16.00000	-	-	-	-	-	-
MIN	.0000000	18.00000	12.00000	4.000000	-	-	-	-	-	-
MAX	36.00000	36.00000	24.00000	16.00000	-	-	-	-	-	-

MARCH 26, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STRCOCCI AD-EVA BR-100ML
AVE	22.00000	42.00000	26.00000	16.00000	-	-	-	-	-	-
NO.	1.000000	1.000000	1.000000	1.000000	-	-	-	-	-	-
MIN	22.00000	42.00000	26.00000	16.00000	-	-	-	-	-	-
MAX	22.00000	42.00000	26.00000	16.00000	-	-	-	-	-	-

FEBRUARY 23-MARCH 26, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STRCOCCI AD-EVA BR-100ML
AVE	18.75000	27.82352	18.94117	9.000000	-	-	-	-	-	-
NO.	16.00000	17.00000	17.00000	17.00000	-	-	-	-	-	-
MIN	.0000000	18.00000	12.00000	4.000000	-	-	-	-	-	-
MAX	36.00000	42.00000	26.00000	16.00000	-	-	-	-	-	-

JUNE-AUGUST, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STRCOCCI AD-EVA BR-100ML
AVE	21.20000	41.42857	32.80000	12.28571	-	-	-	-	-	-
NO.	15.00000	7.000000	10.00000	7.000000	-	-	-	-	-	-
MIN	10.00000	24.00000	18.00000	6.000000	-	-	-	-	-	-
MAX	34.00000	64.00000	48.00000	20.00000	-	-	-	-	-	-

STA. 274870 TALLAHALA CR. INTERSTATE 59 LAUREL

FEBRUARY 23-MARCH 22, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	11.81250	9.018750	90.87500	6.326666	2.271875	22.25000	-	11476.72	4493.909
NO.	-	16.00000	16.00000	16.00000	15.00000	16.00000	16.00000	-	16.00000	15.00000
MIN	-	9.000000	7.700000	71.00000	5.300000	.8000000	5.000000	-	1720.000	1090.000
MAX	-	15.00000	11.60000	103.0000	6.700000	5.050000	40.50000	-	160000.0	160000.0

MARCH 26, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	16.50000	8.500000	-	6.700000	3.800000	35.00000	-	10900.00	7899.999
NO.	-	1.000000	1.000000	-	1.000000	1.000000	1.000000	-	1.000000	1.000000
MIN	-	16.50000	8.500000	-	6.700000	3.800000	35.00000	-	10900.00	7900.000
MAX	-	16.50000	8.500000	-	6.700000	3.800000	35.00000	-	10900.00	7900.000

FEBRUARY 23-MARCH 26, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	12.08823	9.835294	90.87500	6.350000	2.361764	23.00000	-	11441.97	4655.185
NO.	-	17.00000	17.00000	16.00000	16.00000	17.00000	17.00000	-	17.00000	16.00000
MIN	-	9.000000	7.700000	71.00000	5.300000	.8 00000	5.000000	-	1720.000	1090.000
MAX	-	16.50000	11.60000	103.0000	6.700000	5.050000	40.50000	-	160000.0	160000.0

JUNE-JULY, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	25.80000	4.740000	57.50000	6.790000	4.590000	112.3333	350.5555	37762.52	2843.798
NO.	-	10.00000	10.00000	10.00000	10.00000	10.00000	9.000000	9.000000	10.00000	10.00000
MIN	-	24.00000	3.300000	39.00000	6.400000	1.000000	47.00000	165.0000	13000.00	.0000000
MAX	-	28.00000	6.100000	74.00000	7.300000	18.00000	221.0000	660.0000	160000.0	54200.00

FEBRUARY 23-MARCH 22, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	19.26666	24.93750	18.50000	6.437500	-	-	-	-	26.34000	-
NO.	15.00000	16.00000	16.00000	16.00000	-	-	-	-	4.000000	-
MIN	10.00000	18.00000	10.00000	.0000000	-	-	-	-	2.960000	-
MAX	38.00000	32.00000	26.00000	15.00000	-	-	-	-	46.40000	-

MARCH 26, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	22.00000	34.00000	26.00000	8.000000	-	-	-	-	-	-
NO.	1.000000	1.000000	1.000000	1.000000	-	-	-	-	-	-
MIN	22.00000	34.00000	26.00000	8.000000	-	-	-	-	-	-
MAX	22.00000	34.00000	26.00000	8.000000	-	-	-	-	-	-

FEBRUARY 23-MARCH 26, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	19.43750	25.47058	18.94117	6.529411	-	-	-	-	26.34000	-
NO.	16.00000	17.00000	17.00000	17.00000	-	-	-	-	4.000000	-
MIN	10.00000	18.00000	10.00000	.0000000	-	-	-	-	2.960000	-
MAX	38.00000	34.00000	26.00000	15.00000	-	-	-	-	46.40000	-

JUNE-JULY, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	20.20000	53.16666	40.88888	13.16666	-	-	-	-	-	-
NO.	10.00000	6.000000	9.000000	6.000000	-	-	-	-	-	-
MIN	10.00000	29.00000	20.00000	8.000000	-	-	-	-	-	-
MAX	32.00000	88.00000	70.00000	18.00000	-	-	-	-	-	-

APPENDIX VII (Cont.)

STA. 274890 TALLAHALA CR. CO. RD. W. SANDERSVILLE

FEBRUARY 23-MARCH 22, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	11.68750	10.10000	92.53333	6.437500	2.225000	16.81875	-	5919.214	1017.425
NO.	-	16.00000	16.00000	15.00000	16.00000	16.00000	16.00000	-	16.00000	15.00000
MIN	-	9.000000	8.000000	74.00000	5.300000	.2000000	2.000000	-	940.0000	130.0000
MAX	-	15.00000	12.00000	106.0000	7.500000	5.600000	32.00000	-	54000.00	7000.000

MARCH 26, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	17.00000	8.400000	87.00000	6.500000	3.200000	27.00000	-	1720.000	89.99999
NO.	-	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	-	1.000000	1.000000
MIN	-	17.00000	8.400000	87.00000	6.500000	3.200000	27.00000	-	1720.000	90.00000
MAX	-	17.00000	8.400000	87.00000	6.500000	3.200000	27.00000	-	1720.000	90.00000

FEBRUARY 23-MARCH 26, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	12.00000	10.00000	92.18750	6.441176	2.282352	17.41764	-	5504.164	874.3267
NO.	-	17.00000	17.00000	16.00000	17.00000	17.00000	17.00000	-	17.00000	16.00000
MIN	-	9.000000	8.000000	74.00000	5.300000	.2000000	2.000000	-	940.0000	90.00000
MAX	-	17.00000	12.00000	106.0000	7.500000	5.600000	32.00000	-	54000.00	7000.000

JUNE-AUGUST, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	25.46666	6.473333	76.26666	6.800000	2.346153	47.53333	167.2142	5530.268	164.5926
NO.	-	15.00000	15.00000	15.00000	15.00000	13.00000	15.00000	14.00000	15.00000	14.00000
MIN	-	24.00000	4.000000	21.00000	6.300000	.0000000	22.00000	83.00000	1720.000	50.00000
MAX	-	27.00000	8.000000	95.00000	7.400000	4.400000	100.0000	250.0000	34800.00	3480.000

FEBRUARY 23-MARCH 22, 1965

	T ALK ACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	18.06250	24.00000	17.75000	6.250000	-	-	-	-	-	419.5235
NO.	16.00000	16.00000	16.00000	16.00000	-	-	-	-	-	2.000000
MIN	8.000000	12.00000	8.000000	.0000000	-	-	-	-	-	110.0000
MAX	34.00000	36.00000	26.00000	14.00000	-	-	-	-	-	1600.000

MARCH 26, 1965

	T ALK ACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	22.00000	36.00000	26.00000	10.00000	-	-	-	-	-	109.9999
NO.	1.000000	1.000000	1.000000	1.000000	-	-	-	-	-	1.000000
MIN	22.00000	36.00000	26.00000	10.00000	-	-	-	-	-	110.0000
MAX	22.00000	36.00000	26.00000	10.00000	-	-	-	-	-	110.0000

FEBRUARY 23-MARCH 26, 1965

	T ALK ACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	18.29411	24.70588	18.23529	6.470588	-	-	-	-	-	268.5149
NO.	17.00000	17.00000	17.00000	17.00000	-	-	-	-	-	3.000000
MIN	8.000000	12.00000	8.000000	.0000000	-	-	-	-	-	110.0000
MAX	34.00000	36.00000	26.00000	14.00000	-	-	-	-	-	1600.000

JUNE-AUGUST, 1965

	T ALK ACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	17.46666	35.16666	26.44444	10.83333	-	-	-	95.00000	-	-
NO.	15.00000	6.000000	9.000000	6.000000	-	-	-	4.000000	-	-
MIN	6.000000	24.00000	14.00000	8.000000	-	-	-	60.00000	-	-
MAX	28.00000	46.00000	40.00000	16.00000	-	-	-	125.0000	-	-

STA. 274890 TALLAHALA CR. CO. RD. W. SANDERSVILLE (Cont.)

MARCH 22, 1965

	RESIDUE TOTAL MG/L	RESIDUE TOT FLT MG/L	RESIDUE TOT NFLT MG/L	ORG N N MG/L	AMMONIA NH3-N MG/L	NITRITE NO2-N MG/L	NITRATE NO3-N MG/L	T PO4 PO4 MG/L	POLY PO4 PO4 MG/L	ORTHOPO4 PO4 MG/L
AVE	279.0000	135.0000	144.0000	-	-	-	-	-	-	-
NO.	1.000000	1.000000	1.000000	-	-	-	-	-	-	-
MIN	279.0000	135.0000	144.0000	-	-	-	-	-	-	-
MAX	279.0000	135.0000	144.0000	-	-	-	-	-	-	-

JUNE-AUGUST, 1965

	RESIDUE TOTAL MG/L	RESIDUE TOT FLT MG/L	RESIDUE TOT NFLT MG/L	ORG N N MG/L	AMMONIA NH3-N MG/L	NITRITE NO2-N MG/L	NITRATE NO3-N MG/L	T PO4 PO4 MG/L	POLY PO4 PO4 MG/L	ORTHOPO4 PO4 MG/L
AVE	479.3333	19.66666	459.6666	.2666666	.4000000	.0126666	1.850000	.0466666	.0166666	.0300000
NO.	3.000000	3.000000	3.000000	3.000000	3.000000	3.000000	6.000000	3.000000	3.000000	3.000000
MIN	148.0000	6.000000	103.0000	.2000000	.3000000	.0090000	.1000000	.0200000	.0100000	.0000000
MAX	1110.000	45.00000	1102.000	.4000000	.5000000	.0150000	5.000000	.0600000	.0200000	.0500000

STA. 274940 TALLAHOMA CR. CO. RD. N.W. LAUREL

FEBRUARY 23-MARCH 22, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	599.1052	11.87500	10.01875	92.31250	6.180000	3.609375	14.96875	-	6171.848	955.6220
NO.	19.00000	16.00000	16.00000	16.00000	15.00000	16.00000	16.00000	-	16.00000	15.00000
MIN	177.0000	10.00000	8.700000	84.00000	5.400000	.3000000	.0000000	-	1090.000	110.0000
MAX	1400.000	15.00000	11.40000	104.0000	6.600000	18.00000	160.0000	-	34800.00	4600.000

MARCH 26, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	165.0000	17.00000	8.200000	85.00000	6.400000	3.200000	3.000000	-	699.9999	329.9999
NO.	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	-	1.000000	1.000000
MIN	165.0000	17.00000	8.200000	85.00000	6.400000	3.200000	3.000000	-	700.0000	330.0000
MAX	165.0000	17.00000	8.200000	85.00000	6.400000	3.200000	3.000000	-	700.0000	330.0000

FEBRUARY 23-MARCH 26, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	577.4000	12.17647	9.911764	91.88235	6.193750	3.585294	14.26470	-	5430.106	894.1809
NO.	20.00000	17.00000	17.00000	17.00000	16.00000	17.00000	17.00000	-	17.00000	16.00000
MIN	165.0000	10.00000	8.200000	84.00000	5.400000	.3000000	.0000000	-	700.0000	110.0000
MAX	1400.000	17.00000	11.40000	104.0000	6.600000	18.00000	160.0000	-	34800.00	4600.000

JUNE-AUGUST, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	12.48333	26.40000	5.750000	70.80000	6.600000	1.920000	8.777777	70.50000	23366.28	1607.396
NO.	6.000000	10.00000	10.00000	10.00000	10.00000	10.00000	9.000000	8.000000	10.00000	10.00000
MIN	.0000000	24.00000	5.000000	60.00000	5.500000	.0000000	5.000000	50.00000	1090.000	170.0000
MAX	25.50000	30.00000	6.600000	82.00000	7.000000	4.000000	16.00000	100.0000	160000.0	54200.00

FEBRUARY 23-MARCH 22, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	16.53333	18.87500	11.50000	7.250000	-	-	-	-	-	-
NO.	15.00000	16.00000	16.00000	16.00000	-	-	-	-	-	-
MIN	8.000000	8.000000	6.000000	2.000000	-	-	-	-	-	-
MAX	40.00000	32.00000	18.00000	22.00000	-	-	-	-	-	-

STA. 274940 TALLAHOMA CR. CO. RD. N.W. LAUREL (Cont.)

MARCH 26, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	24.00000	24.00000	16.00000	8.000000	-	-	-	-	-	-
NO.	1.000000	1.000000	1.000000	1.000000	-	-	-	-	-	-
MIN	24.00000	24.00000	16.00000	8.000000	-	-	-	-	-	-
MAX	24.00000	24.00000	16.00000	8.000000	-	-	-	-	-	-

FEBRUARY 23-MARCH 26, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	17.00000	19.17647	11.76470	7.294117	-	-	-	-	-	-
NO.	16.00000	17.00000	17.00000	17.00000	-	-	-	-	-	-
MIN	8.000000	8.000000	6.000000	2.000000	-	-	-	-	-	-
MAX	40.00000	32.00000	18.00000	22.00000	-	-	-	-	-	-

JUNE-AUGUST, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	18.60000	25.60000	16.00000	8.000000	.0105000	.0000000	-	113.3333	-	-
NO.	10.00000	5.000000	8.000000	5.000000	2.000000	1.000000	-	3.000000	-	-
MIN	2 000000	16.00000	12.00000	4.000000	.0010000	.0000000	-	90.00000	-	-
MAX	30.00000	32.00000	22.00000	10.00000	.0200000	.0000000	-	150.0000	-	-

JUNE-AUGUST, 1965

	R SIDUE TOTAL MG/L	RESIDUE TOT FLT MG/L	RESIDUE TOT NFLT MG/L	ORG N N MG/L	AMMONIA NH3-N MG/L	NITRITE NO2-N MG/L	NITRATE NO3-N MG/L	T PO4 PO4 MG/L	POLY PO4 PO4 MG/L	ORTHOPO4 PO4 MG/L
AVE	91.33333	7.000000	84.33333	-	-	-	2.333333	-	-	-
NO.	3.000000	3.000000	3.000000	-	-	-	3.000000	-	-	-
MIN	76.00000	3.000000	68.00000	-	-	-	2.000000	-	-	-
MAX	100.0000	10.00000	95.00000	-	-	-	2.800000	-	-	-

STA. 275005 LEAF R. CO. RD. N. MAHNED

FEBRUARY 24-MARCH 22, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	12.06250	9.484375	87.12500	6.243750	14.92875	10.28125	-	54199.99	24000.00
NO.	-	16.00000	16.00000	16.00000	16.00000	16.00000	16.00000	-	1.000000	1.000000
MIN	-	9.000000	8.300000	78.00000	6.000000	.5000000	2.000000	-	54200.00	24000.00
MAX	-	15.00000	10.30000	96.00000	6.700000	135.0000	30.00000	-	54200.00	24000.00

MARCH 26, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	18.00000	7.300000	76.00000	6.600000	50.60000	50.00000	-	-	-
NO.	-	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	-	-	-
MIN	-	18.00000	7.300000	76.00000	6.600000	50.60000	50.00000	-	-	-
MAX	-	18.00000	7.300000	76.00000	6.600000	50.60000	50.00000	-	-	-

FEBRUARY 24-MARCH 26, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	12.41176	9.355882	86.47058	6.264705	17.02705	12.61764	-	54199.99	24000.00
NO.	-	17.00000	17.00000	17.00000	17.00000	17.00000	17.00000	-	1.000000	1.000000
MIN	-	9.000000	7.300000	76.00000	6.000000	.5000000	2.000000	-	54200.00	24000.00
MAX	-	18.00000	10.30000	96.00000	6.700000	135.0000	50.00000	-	54200.00	24000.00

APPENDIX VII (Cont.)

STA. 275005 LEAF R. CO. RD. N. MAHNED (Cont.)

JUNE-AUGUST, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH SU	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	28.40000	5.800000	74.13333	6.333333	5.518181	81.35714	255.2307	82820.14	16674.20
NO.	-	15.00000	15.00000	15.00000	15.00000	11.00000	14.00000	13.00000	15.00000	15.00000
MIN	-	26.00000	4.100000	50.00000	5.800000	2.000000	10.00000	8.000000	9000.000	2210.000
MAX	-	31.00000	7.600000	100.0000	7.200000	16.00000	276.0000	800.0000	542000.0	141000.0

FEBRUARY 24-MARCH 22, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	13.37500	16.26666	9.800000	6.466666	-	-	-	-	-	-
NO.	16.00000	15.00000	15.00000	15.00000	-	-	-	-	-	-
MIN	8.000000	10.00000	8.000000	2.000000	-	-	-	-	-	-
MAX	20.00000	28.00000	16.00000	20.00000	-	-	-	-	-	-

MARCH 26, 1965

AVE	14.00000	16.00000	11.00000	5.000000	-	-	-	-	-	-
NO.	1.000000	1.000000	1.000000	1.000000	-	-	-	-	-	-
MIN	14.00000	16.00000	11.00000	5.000000	-	-	-	-	-	-
MAX	14.00000	16.00000	11.00000	5.000000	-	-	-	-	-	-

FEBRUARY 24-MARCH 26, 1965

AVE	13.41176	16.25000	9.875000	6.375000	-	-	-	-	-	-
NO.	17.00000	16.00000	16.00000	16.00000	-	-	-	-	-	-
MIN	8.000000	10.00000	8.000000	2.000000	-	-	-	-	-	-
MAX	20.00000	28.00000	16.00000	20.00000	-	-	-	-	-	-

JUNE-AUGUST, 1965

AVE	10.73333	14.20000	10.11111	6.400000	-	-	-	-	-	-
NO.	15.00000	5.000000	9.000000	5.000000	-	-	-	-	-	-
MIN	6.000000	11.00000	3.000000	3.000000	-	-	-	-	-	-
MAX	16.00000	18.00000	20.00000	13.00000	-	-	-	-	-	-

STA. 275050 LEAF R. CO. RD. N.E. McCALLUM

JUNE-AUGUST, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	27.73333	4.720000	59.46666	6.213333	3.728571	114.7857	402.2727	108162.1	35528.07
NO.	-	15.00000	15.00000	15.00000	15.00000	14.00000	14.00000	11.00000	14.00000	14.00000
MIN	-	25.00000	3.100000	39.00000	5.700000	1.900000	4.000000	70.00000	7900.000	500.0000
MAX	-	31.00000	6.200000	78.00000	6.600000	8.600000	614.0000	1600.000	1600000.	1600000.

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	12.00000	28.50000	12.25000	15.50000	-	-	-	-	-	-
NO.	14.00000	4.000000	8.000000	4.000000	-	-	-	-	-	-
MIN	8.000000	14.00000	8.000000	4.000000	-	-	-	-	-	-
MAX	22.00000	50.00000	20.00000	38.00000	-	-	-	-	-	-

APPENDIX VII (Cont.)

STA. 275065 LEAF R. 0.9 MILE BELOW GAS LINE

AUGUST, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	27.33333	5.166666	64.33333	5.833333	3.166666	39.33333	144.3333	-	-
NO.	-	3.000000	3.000000	3.000000	3.000000	3.000000	3.000000	3.000000	-	-
MIN	-	27.00000	4.200000	53.00000	5.600000	2.600000	20.00000	73.00000	-	-
MAX	-	28.00000	5.900000	73.00000	6.100000	3.700000	71.00000	260.0000	-	-

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	9.000000	-	-	-	-	-	-	-	-	-
NO.	3.000000	-	-	-	-	-	-	-	-	-
MIN	6.000000	-	-	-	-	-	-	-	-	-
MAX	12.00000	-	-	-	-	-	-	-	-	-

STA. 275070 LEAF R. 0.1 MILE BELOW GAS LINE

JUNE-AUGUST, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	28.26666	4.880000	60.85714	6.186666	7.520000	96.85714	418.6363	111787.6	32766.70
NO.	-	15.00000	15.00000	14.00000	15.00000	10.00000	14.00000	11.00000	14.00000	14.00000
MIN	-	26.00000	3.900000	49.00000	5.600000	1.600000	9.000000	60.00000	5420.000	3480.000
MAX	-	32.00000	6.100000	75.00000	6.800000	36.00000	484.0000	1600.000	16000000	348000.0

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	10.46153	17.20000	10.55555	6.400000	-	-	-	-	-	-
NO.	13.00000	5.000000	9.000000	5.000000	-	-	-	-	-	-
MIN	8.000000	10.00000	6.000000	4.000000	-	-	-	-	-	-
MAX	16.00000	32.00000	20.00000	12.00000	-	-	-	-	-	-

AUGUST-NOVEMBER, 1965

	RESIDUE TOTAL MG/L	RESIDUE TOT FLT MG/L	RESIDUE TOT NFLT MG/L	ORG N N MG/L	AMMONIA NH3-N MG/L	NITRITE NO2-N MG/L	NITRATE NO3-N MG/L	T PO4 PO4 MG/L	POLY PO4 PO4 MG/L	ORTHOPO4 PO4 MG/L
AVE	141.0000	5.500000	135.5000	.3666666	.7000000	.0373333	1.550000	.6000000	.1200000	.4800000
NO.	2 000000	2.000000	2.000000	3.000000	3.000000	3.000000	6.000000	3.000000	3.000000	3.000000
MIN	120.0000	2.000000	111.0000	.0000000	.6000000	.0340000	.1000000	.4300000	.0500000	.3000000
MAX	162.0000	9.000000	160.0000	.7000000	.8000000	.0400000	4.600000	.8400000	.1800000	.6600000

APPENDIX VII (Cont.)

STA. 275198 LEAF R. U.S. 11 HATTIESBURG

JUNE-AUGUST, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	995.4000	27.00000	6.328571	77.92857	6.221428	2.940000	144.3333	455.0909	22435.18	4091.369
NO.	15.00000	15.00000	14.00000	14.00000	14.00000	15.00000	15.00000	11.00000	15.00000	15.00000
MIN	500.0000	25.00000	3.200000	42.00000	5.700000	.6000000	7.000000	40.00000	2210.000	20.00000
MAX	1684.000	30.00000	7.200000	88.00000	6.700000	7.400000	768.0000	1600.000	130000.0	79000.00

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	10.14285	15.80000	9.555555	6.800000	-	-	-	-	-	-
NO.	14.00000	5.000000	9.000000	5.000000	-	-	-	-	-	-
MIN	4 000000	10.00000	4.000000	5.000000	-	-	-	-	-	-
MAX	14.00000	28.00000	20.00000	9.000000	-	-	-	-	-	-

STA. 275220 BOWIE R. INTERSTATE 59 HATTIESBURG

MAY-AUGUST, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	364.9000	25.12500	7.400000	88.66666	6.350000	1.466666	5.437500	24.50000	14026.07	1062.201
NO.	10.00000	16.00000	15.00000	15.00000	16.00000	15.00000	16.00000	12.00000	16.00000	16.00000
MIN	148.0000	23.00000	7.000000	82.00000	5.500000	.4000000	3.000000	20.00000	2210.000	170.0000
MAX	639.0000	28.00000	7.900000	95.00000	7.400000	2.700000	10.00000	30.00000	160000.0	14000.00

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	13.13333	7.833333	5.100000	3.333333	-	-	-	-	-	-
NO.	15.00000	6.000000	10.00000	6.000000	-	-	-	-	-	-
MIN	5.000000	6.000000	2.000000	2.000000	-	-	-	-	-	-
MAX	60.00000	10.00000	8.000000	4.000000	-	-	-	-	-	-

STA. 275260 OKATOMA CR. MISS. 598 SANFORD

MAY-AUGUST, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	204.9000	25.00000	6.956250	83.37500	6.106250	1.900000	7.187500	31.08333	12051.40	1335.675
NO.	10.00000	16.00000	16.00000	16.00000	16.00000	15.00000	16.00000	12.00000	16.00000	16.00000
MIN	95.00000	23.00000	6.500000	76.00000	3.400000	.5000000	3.000000	22.00000	2300.000	170.0000
MAX	330.0000	28.00000	7.400000	90.00000	7.300000	4.600000	20.00000	40.00000	160000.0	54200.00

APPENDIX VII (Cont.)

STA. 275260 OKATOMA CR. MISS. 598 SANFORD (Cont.)

MAY-AUGUST, 1965

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	10.50000	11.00000	6.300000	5.666666	-	-	-	-	-	-
NO.	14.00000	6.000000	10.00000	6.000000	-	-	-	-	-	-
MIN	6.000000	7.000000	4.000000	1.000000	-	-	-	-	-	-
MAX	16.00000	18.00000	10.00000	13.00000	-	-	-	-	-	-

	RESIDUE TOTAL MG/L	RESIDUE TOT FLT MG/L	RESIDUE TOT NFLT MG/L	ORG N N MG/L	AMMONIA NH3-N MG/L	NITRITE NO2-N MG/L	NITRATE NO3-N MG/L	T PO4 PO4 MG/L	POLY PO4 PO4 MG/L	ORTHOPO4 PO4 MG/L
AVE	179.5000	109.0000	70.50000	.0000000	.2000000	.0170000	1.650000	.2100000	.0400000	.1700000
NO.	2.000000	2.000000	2.000000	1.000000	1.000000	1.000000	2.000000	1.000000	1.000000	1.000000
MIN	41.00000	6.000000	35.00000	.0000000	.2000000	.0170000	.1000000	.2100000	.0400000	.1700000
MAX	318.0000	212.0000	106.0000	.0000000	.2000000	.0170000	3.200000	.2100000	.0400000	.1700000

STA. 275350 BOWIE CR. U.S. 49 N.W. HATTIESBURG

MAY-AUGUST, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	158.3937	24.75000	7.518750	89.62500	6.231250	1.620000	6.600000	28.25000	6033.741	340.0118
NO.	16.00000	16.00000	16.00000	16.00000	16.00000	15.00000	15.00000	12.00000	16.00000	16.00000
MIN	103.7000	23.00000	6.900000	81.00000	5.400000	.2000000	1.000000	17.00000	700.0000	20.00000
MAX	309.0000	27.00000	8.100000	96.00000	6.900000	7.200000	26.00000	106.0000	92000.00	7900.000

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	10.20000	8.600000	4.888888	4.400000	-	-	-	-	-	-
NO.	15.00000	5.000000	9.000000	5.000000	-	-	-	-	-	-
MIN	6 000000	6.000000	2.000000	2.000000	-	-	-	-	-	-
MAX	16.00000	14.00000	7.000000	8.000000	-	-	-	-	-	-

	RESIDUE OTAL MG/L	RESIDUF TOT FLT MG/L	RESIDUE TOT NFLT MG/L	ORG N N MG/L	AMMONIA NH3-N MG/L	NITRITE NO2-N MG/L	NITRATE NO3-N MG/L	T PO4 PO4 MG/L	POLY PO4 PO4 MG/L	ORTHOPO4 PO4 MG/L
AVE	305.0000	42.50000	262.5000	.9000000	.2000000	.0210000	1.050000	.0400000	.0000000	.0400000
NO.	2.000000	2.000000	2.000000	1.000000	1.000000	1.000000	2.000000	1.000000	1.000000	1.000000
MIN	210.0000	10.00000	200.0000	.9000000	.2000000	.0210000	.1000000	.0400000	.0000000	.0400000
MAX	400.0000	75.00000	325.0000	.9000000	.2000000	.0210000	2.000000	.0400000	.0000000	.0400000

APPENDIX VII (Cont.)

STA. 275460 LEAF R. CO. RD. W. EASTABUTCHIE

MAY-AUGUST, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	434.4500	27.03225	7.403225	92.00000	6.277419	1.648387	12.56666	61.73076	6496.833	488.3942
NO.	20.00000	31.00000	31.00000	31.00000	31.00000	31.00000	30.00000	26.00000	31.00000	31.00000
MIN	190.0000	24.00000	6.300000	77.00000	3.200000	.4000000	3.000000	35.00000	630.0000	20.00000
MAX	1100.000	30.00000	8.400000	106.0000	7.200000	3.500000	25.00000	210.0000	92000.00	22100.00

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	11.75862	16.08333	10.36842	6.500000	-	-	-	-	-	-
NO.	29.00000	12.00000	19.00000	12.00000	-	-	-	-	-	-
MIN	8.000000	12.00000	2.000000	2.000000	-	-	-	-	-	-
MAX	20.00000	22.00000	16.00000	11.00000	-	-	-	-	-	-

STA. 275500 LEAF R. INTERSTATE 59 W. MOSELLE

MAY-JULY, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	27.27272	7.309090	90.87272	6.530000	1.454545	14.70000	54.20000	3513.762	215.7041
NO.	-	11.00000	11.00000	11.00000	10.00000	11.00000	10.00000	10.00000	11.00000	10.00000
MIN	-	25.00000	6.900000	84.00000	6.100000	.4000000	7.000000	38.00000	490.0000	.0000000
MAX	-	30.00000	7.800000	100.0000	7.000000	4.900000	25.00000	85.00000	160000.0	7900.000

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	12.60000	17.42857	11.40000	6.285714	-	-	-	-	-	-
NO.	10.00000	7.000000	10.00000	7.000000	-	-	-	-	-	-
MIN	8.000000	14.00000	10.00000	4.000000	-	-	-	-	-	-
MAX	20.00000	26.00000	16.00000	12.00000	-	-	-	-	-	-

STA. 275590 LEAF R. MISS. 588 W. ELLISVILLE

MAY-AUGUST, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	-	26.37500	7.737500	94.55625	6.462500	1.813333	14.62500	68.93333	3219.882	241.6452
NO.	-	16.00000	16.00000	16.00000	16.00000	15.00000	16.00000	15.00000	16.00000	16.00000
MIN	-	24.00000	7.200000	88.00000	6.000000	.5000000	5.000000	42.00000	20.00000	20.00000
MAX	-	29.00000	8.300000	101.0000	6.900000	4.300000	30.00000	120.0000	54200.00	7000.000

	T ALK ACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	13.31250	17.75000	12.36363	6.750000	-	-	-	-	-	-
NO.	16.00000	8.000000	11.00000	8.000000	-	-	-	-	-	-
MIN	8.000000	16.00000	8.000000	4.000000	-	-	-	-	-	-
MAX	20.00000	22.00000	20.00000	10.00000	-	-	-	-	-	-

APPENDIX VII (Cont.)

STA. 275610 BIG CR. U.S. 84 W. LAUREL

MAY-AUGUST, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	24.90000	24.87500	7.406250	88.28750	6.350000	1.418750	32.40000	101.6666	3745.535	187.9514
NO.	10.00000	16.00000	16.00000	16.00000	16.00000	16.00000	15.00000	15.00000	16.00000	16.00000
MIN	12.80000	23.00000	6.[illegible]00000	78.00000	5.900000	.5000000	20.00000	50.00000	630.0000	20.00000
MAX	48.00000	27.00000	7.900000	96.00000	6.900000	2.300000	119.0000	350.0000	34800.00	2210.000

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	10.87500	22.50000	18.22222	9.166666	-	-	-	65.00000	-	-
NO.	16.00000	6.000000	9.000000	6.000000	-	-	-	1.000000	-	-
MIN	6.000000	20.00000	10.00000	6.000000	-	-	-	65.00000	-	-
MAX	16.00000	26.00000	56.00000	12.00000	-	-	-	65.00000	-	-

	RESIDUE TOTAL MG/L	RESIDUE TOT FLT MG/L	RESIDUE TOT NFLT MG/L	ORG N N MG/L	AMMONIA NH3-N MG/L	NITRITE NO2-N MG/L	NITRATE NO3-N MG/L	T PO4 PO4 MG/L	POLY PO4 PO4 MG/L	ORTHOPO4 PO4 MG/L
AVE	118.0000	30.66666	87.33333	.3500000	.2000000	.0055000	3.650000	.0650000	.0350000	.0300000
NO.	3.000000	3.000000	3.000000	2.000000	2.000000	2.000000	6.000000	2.000000	2.000000	2.000000
MIN	82.00000	4.000000	64.00000	.2000000	.2000000	.0030000	.1000000	.0400000	.0300000	.0000000
MAX	152.0000	70.00000	116.0000	.5000000	.2000000	.0080000	10.50000	.0900000	.0400000	.0600000

STA. 275710 LEAF R. U.S. 84 REDDOCHS

MAY-AUGUST, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	137.1000	25.43750	7.593750	91.52500	6.518750	1.506666	17.56250	77.50000	5586.647	303.3066
NO.	10.00000	16.00000	16.00000	16.00000	16.00000	15.00000	16.00000	14.00000	16.00000	15.00000
MIN	95.00000	22.00000	7.100000	81.00000	6.000000	.1000000	7.000000	42.00000	790.0000	50.00000
MAX	243.0000	28.00000	8.300000	101.0000	7.000000	3.000000	108.0000	360.0000	160000.0	4900.000

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	15.12500	26.50000	15.63636	11.75000	-	-	-	61.25000	-	-
NO.	16.00000	8.000000	11.00000	8.000000	-	-	-	4.000000	-	-
MIN	10.00000	16.00000	8.000000	4.000000	-	-	-	25.00000	-	-
MAX	24.00000	80.00000	36.00000	44.00000	-	-	-	90.00000	-	-

	RESIDUE TOTAL MG/L	RESIDUE TOT FLT MG/L	RESIDUE TOT NFLT MG/L	ORG N N MG/L	AMMONIA NH3-N MG/L	NITRITE NO2-N MG/L	NITRATE NO3-N MG/L	T PO4 PO4 MG/L	POLY PO4 PO4 MG/L	ORTHOPO4 PO4 MG/L
AVE	92.66666	37.33333	58.66666	.2000000	.2333333	.0086666	4.616666	.0733333	.0033333	.0700000
NO.	3.000000	3.000000	3.000000	3.000000	3.000000	3.000000	6.000000	3.000000	3.000000	3.000000
MIN	78.00000	15.00000	53.00000	.2000000	.2000000	.0020000	.1000000	.0500000	.0000000	.0400000
MAX	100.0000	50.00000	63.00000	.2000000	.3000000	.0150000	20.00000	.1200000	.0100000	.1200000

APPENDIX VII (Cont.)

STA. 275730 OAKOHAY CR. MISS. 37 HOT COFFEE

MAY-AUGUST, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	65.83000	24.62500	7.400000	87.93333	6.343750	1.418750	10.33333	40.26666	4918.714	409.4521
NO.	10.00000	16.00000	15.00000	15.00000	16.00000	16.00000	15.00000	15.00000	16.00000	14.00000
MIN	53.50000	22.00000	6.100000	72.00000	5.600000	.3000000	6.000000	30.00000	790.0000	20.00000
MAX	89.00000	27.00000	8.400000	99.00000	7.400000	2.500000	28.00000	80.00000	92000.00	4900.000

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	12.87500	12.66666	7.555555	6.333333	-	-	-	-	-	-
NO.	16.00000	6.000000	9.000000	6.000000	-	-	-	-	-	-
MIN	6.000000	8.000000	.0000000	1.000000	-	-	-	-	-	-
MAX	70.00000	20.00000	12.00000	10.00000	-	-	-	-	-	-

STA. 275810 LEAF R. MISS. 28 TAYLORSVILLE

MAY-AUGUST, 1965

	STREAM FLOW CUFT/SEC	WATER TEMP CENT	DO MG/L	DO SATUR PERCENT	PH S U	BOD 5 DAY MG/L	CHLORIDE CL MG/L	CNDUCTVY AT 25C MICROMHO	COLIFORM MPN CONF /100ML	FEC COLI EC 44.5 T./100ML
AVE	58.08000	25.43750	7.437500	89.50000	6.743750	2.268750	5.875000	49.60000	7969.872	842.8044
NO.	10.00000	16.00000	16.00000	16.00000	16.00000	16.00000	16.00000	15.00000	16.00000	15.00000
MIN	42.50000	22.00000	6.300000	75.00000	5.800000	.5000000	2.000000	36.00000	2210.000	80.00000
MAX	70.00000	27.00000	8.400000	101.0000	7.100000	5.100000	12.00000	62.00000	92000.00	7000.000

	T ALK CACO3 MG/L	TOT HARD CACO3 MG/L	CALCIUM CACO3 MG/L	MGNSIUM CACO3 MG/L	IRON TOTAL UG/L	MANGNESE TOTAL UG/L	TURB JKSN JU	COLOR PT-CO UNITS	COD LOWLEVEL MG/L	STPCOCCI AD-EVA BR-100ML
AVE	23.37500	26.14285	16.90000	9.714285	-	-	-	-	-	-
NO.	16.00000	7.000000	10.00000	7.000000	-	-	-	-	-	-
MIN	16.00000	20.00000	13.00000	6.000000	-	-	-	-	-	-
MAX	36.00000	38.00000	22.00000	18.00000	-	-	-	-	-	-

Notes:

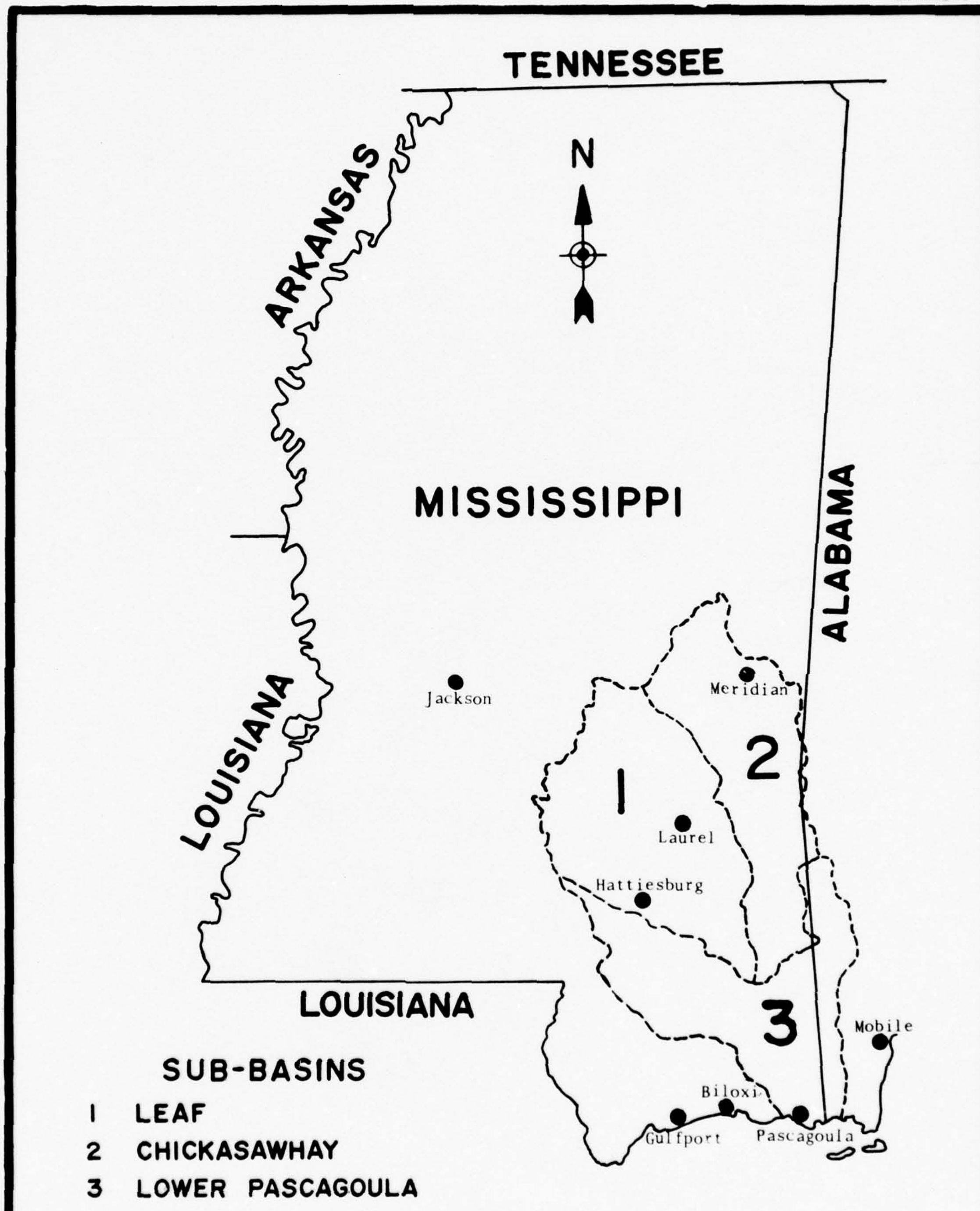
1) Results presented herein were compiled by computer facilities; therefore averages presented may indicate accuracy beyound testing capabilities.

2) Averages shown for bacteriological parameters are geometric means and not arithmetic averages.

APPENDIX VIII

EXHIBITS

Exhibit I

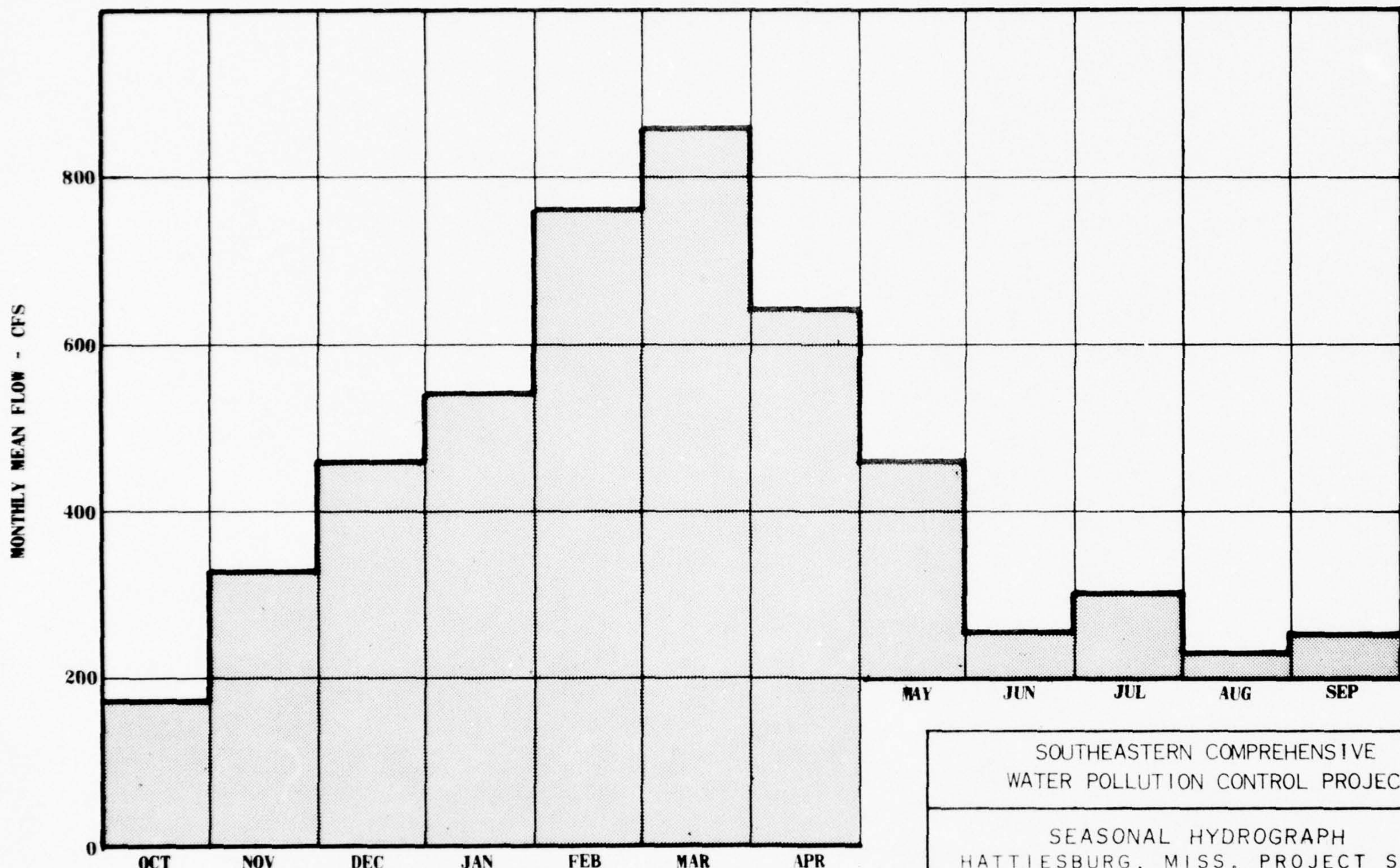


SOUTHEASTERN COMPREHENSIVE
WATER POLLUTION CONTROL PROJECT

VICINITY MAP
PASCAGOULA RIVER BASIN

U. S. DEPARTMENT OF THE INTERIOR
Federal Water Pollution Control Administration
SOUTHEAST REGION ATLANTA, GEORGIA

Exhibit 2



NOTES: 1. THIS GRAPH REPRESENTS THE AVERAGE MONTHLY FLOWS FOR THE PERIOD OF RECORD 1938 - 1960 FOR USGS STATION NEAR HATTIESBURG

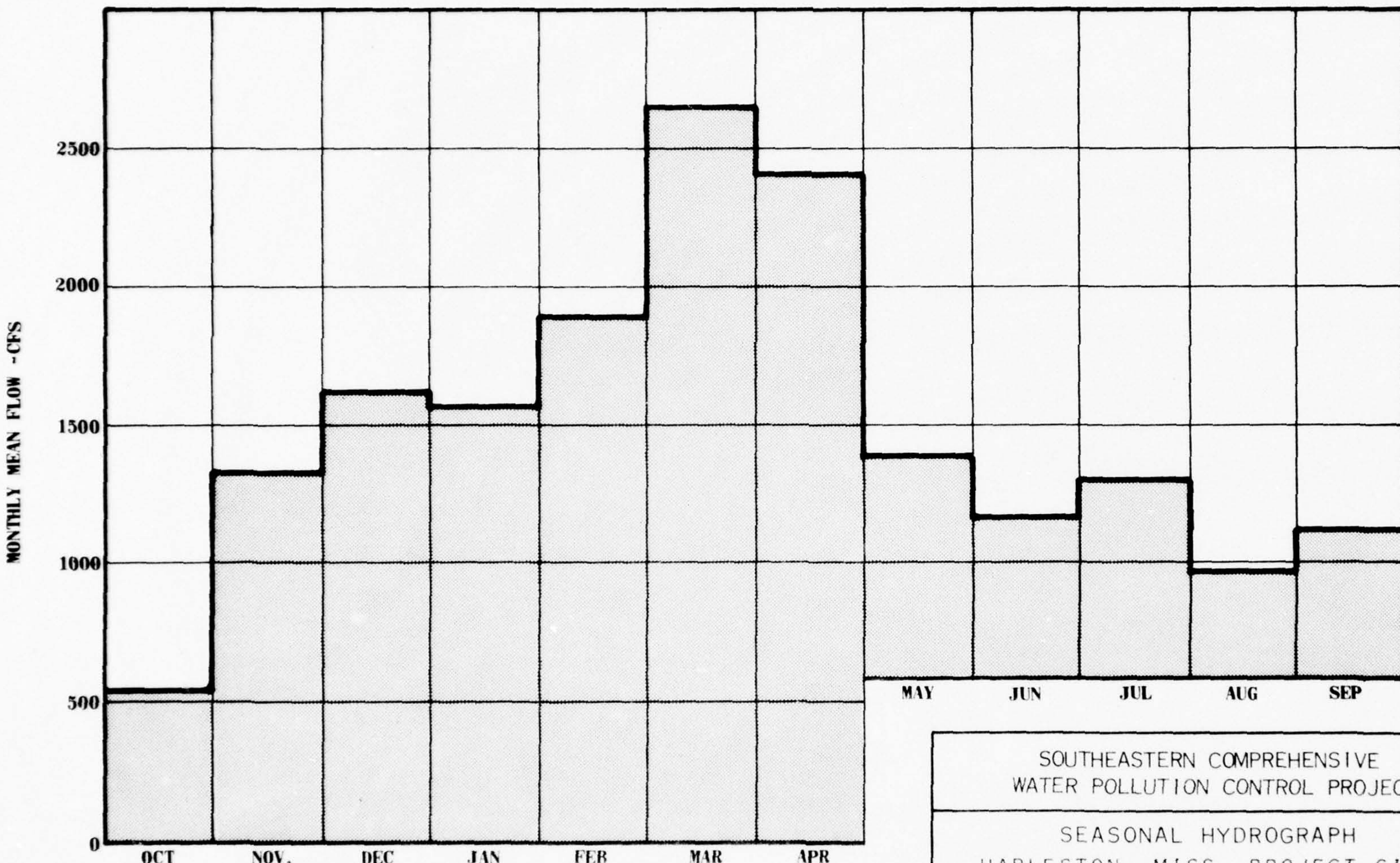
2. DRAINAGE AREA 304 SQ MILES

SOUTHEASTERN COMPREHENSIVE
WATER POLLUTION CONTROL PROJECT

SEASONAL HYDROGRAPH
HATTIESBURG, MISS. PROJECT SITE
BOWIE CREEK

U. S. DEPARTMENT OF THE INTERIOR
Federal Water Pollution Control Administration
SOUTHEAST REGION ATLANTA, GEORGIA

Exhibit 3



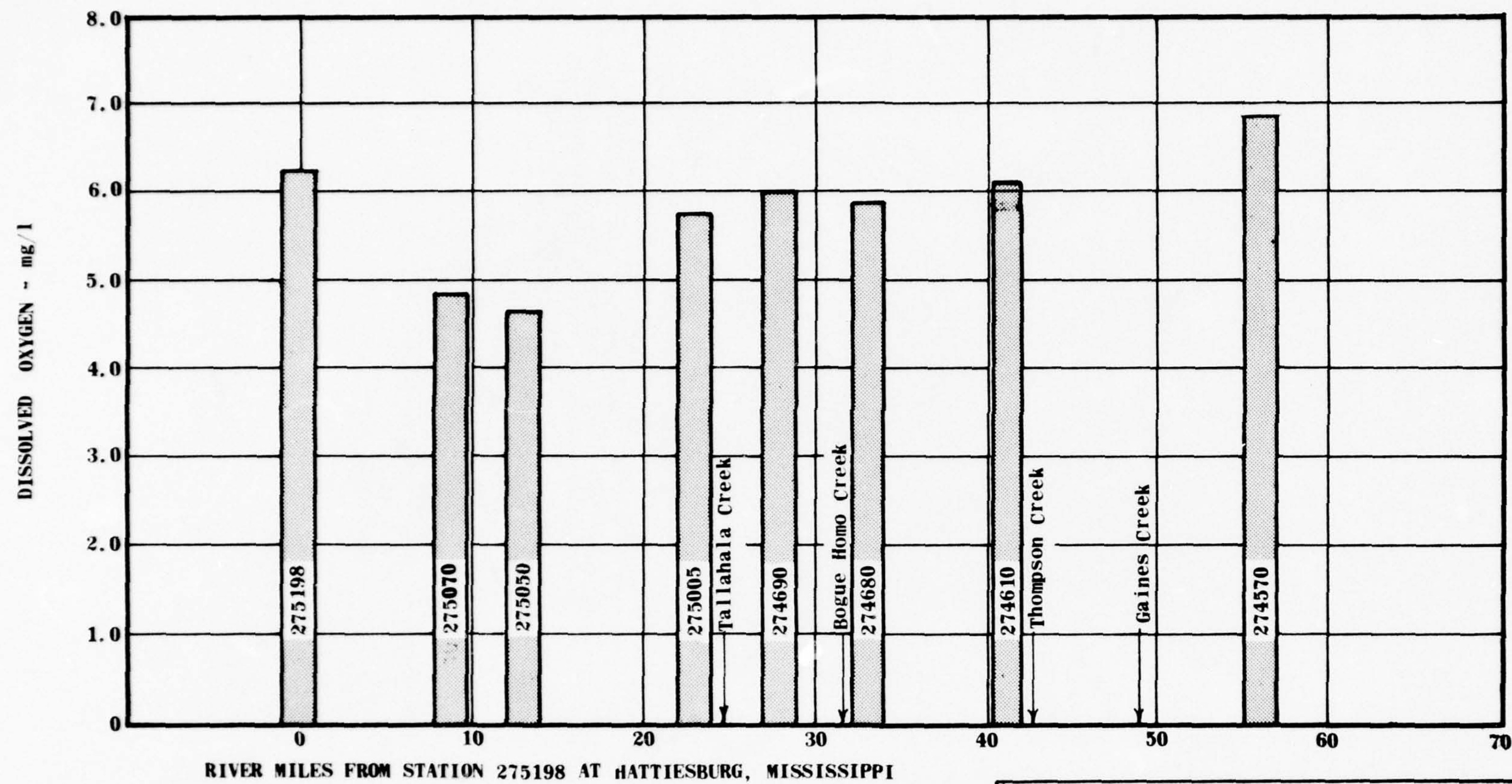
NOTE: THIS GRAPH REPRESENTS AVERAGE MONTHLY FLOWS INTERPRETED FROM USGS DATA BY FWPCA. PERIOD OF RECORD 1945 - 1960

SOUTHEASTERN COMPREHENSIVE
WATER POLLUTION CONTROL PROJECT

SEASONAL HYDROGRAPH
HARLESTON, MISS. PROJECT SITE
ESCATAWPA RIVER

U. S. DEPARTMENT OF THE INTERIOR
Federal Water Pollution Control Administration
SOUTHEAST REGION ATLANTA, GEORGIA

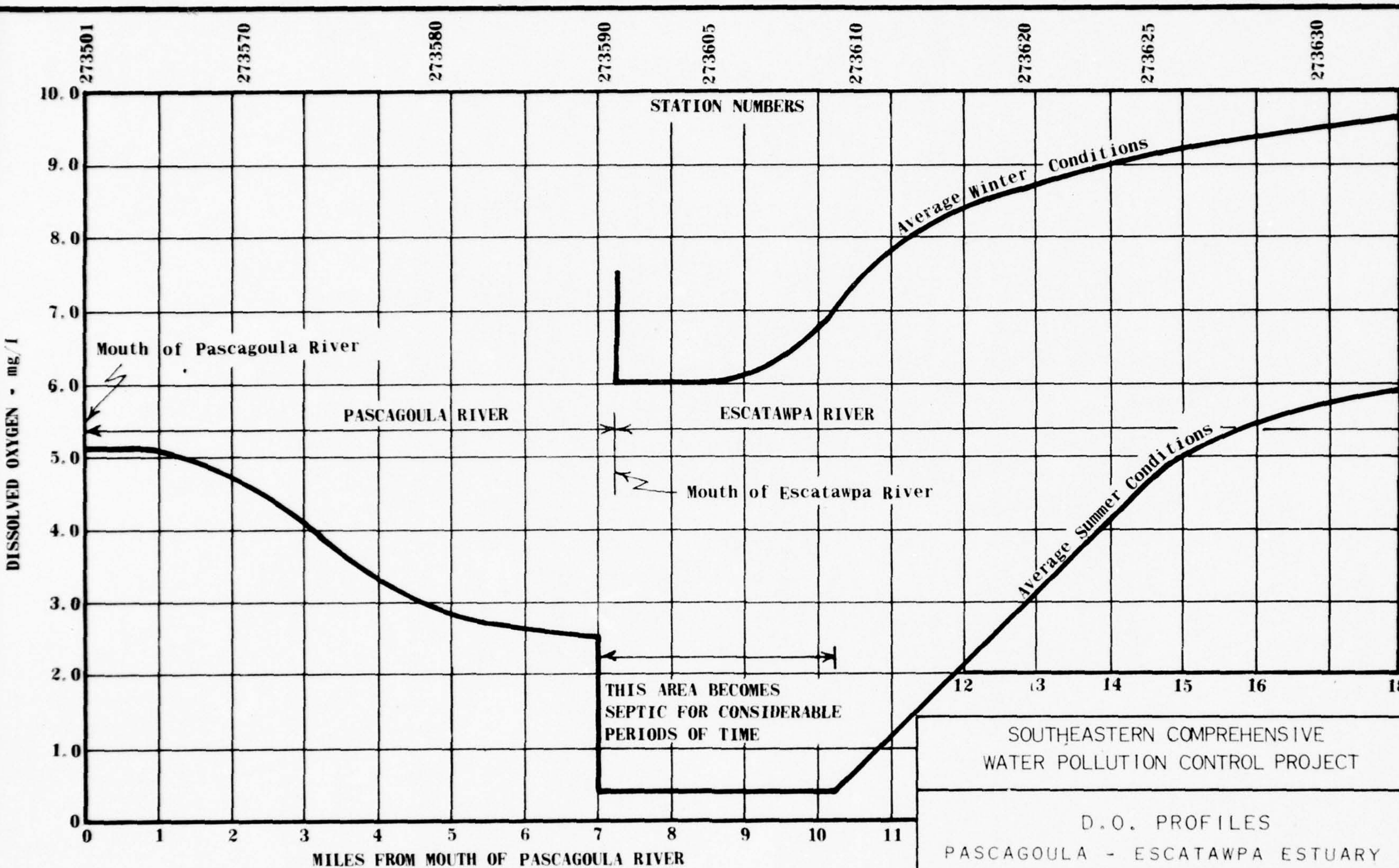
Exhibit 4



SOUTHEASTERN COMPREHENSIVE
WATER POLLUTION CONTROL PROJECT

D.O. CONCENTRATIONS
LEAF RIVER BELOW HATTIESBURG, MISS.
JUNE THRU AUGUST 1965

U. S. DEPARTMENT OF THE INTERIOR
Federal Water Pollution Control Administration
SOUTHEAST REGION ATLANTA, GEORGIA



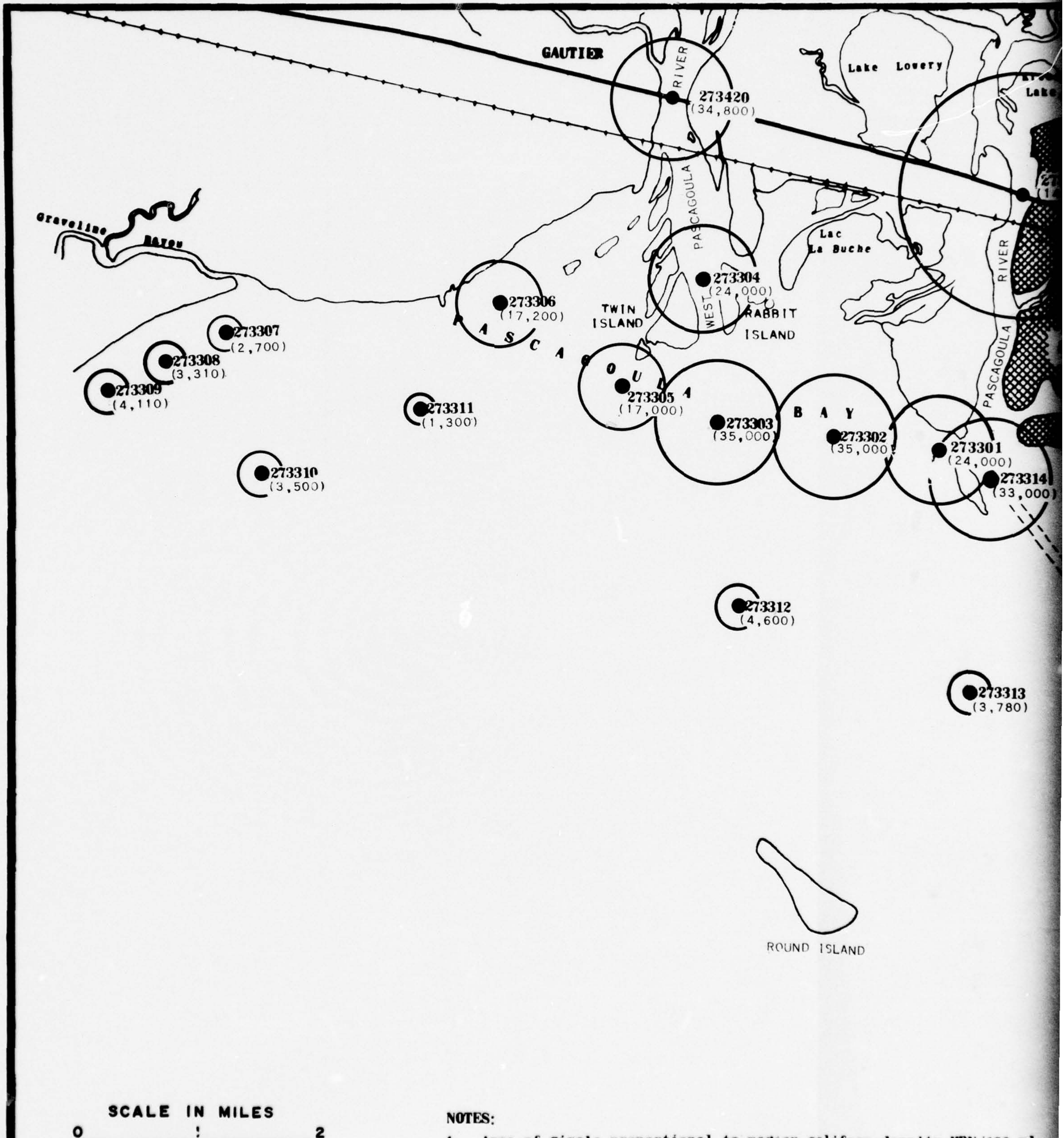
NOTE: SEE EXHIBIT 14 FOR LOCATION MAP SHOWING THIS AREA.

SOUTHEASTERN COMPREHENSIVE
WATER POLLUTION CONTROL PROJECT

D.O. PROFILES
PASCAGOULA - ESCATAWPA ESTUARY

U. S. DEPARTMENT OF THE INTERIOR
Federal Water Pollution Control Administration
SOUTHEAST REGION ATLANTA, GEORGIA

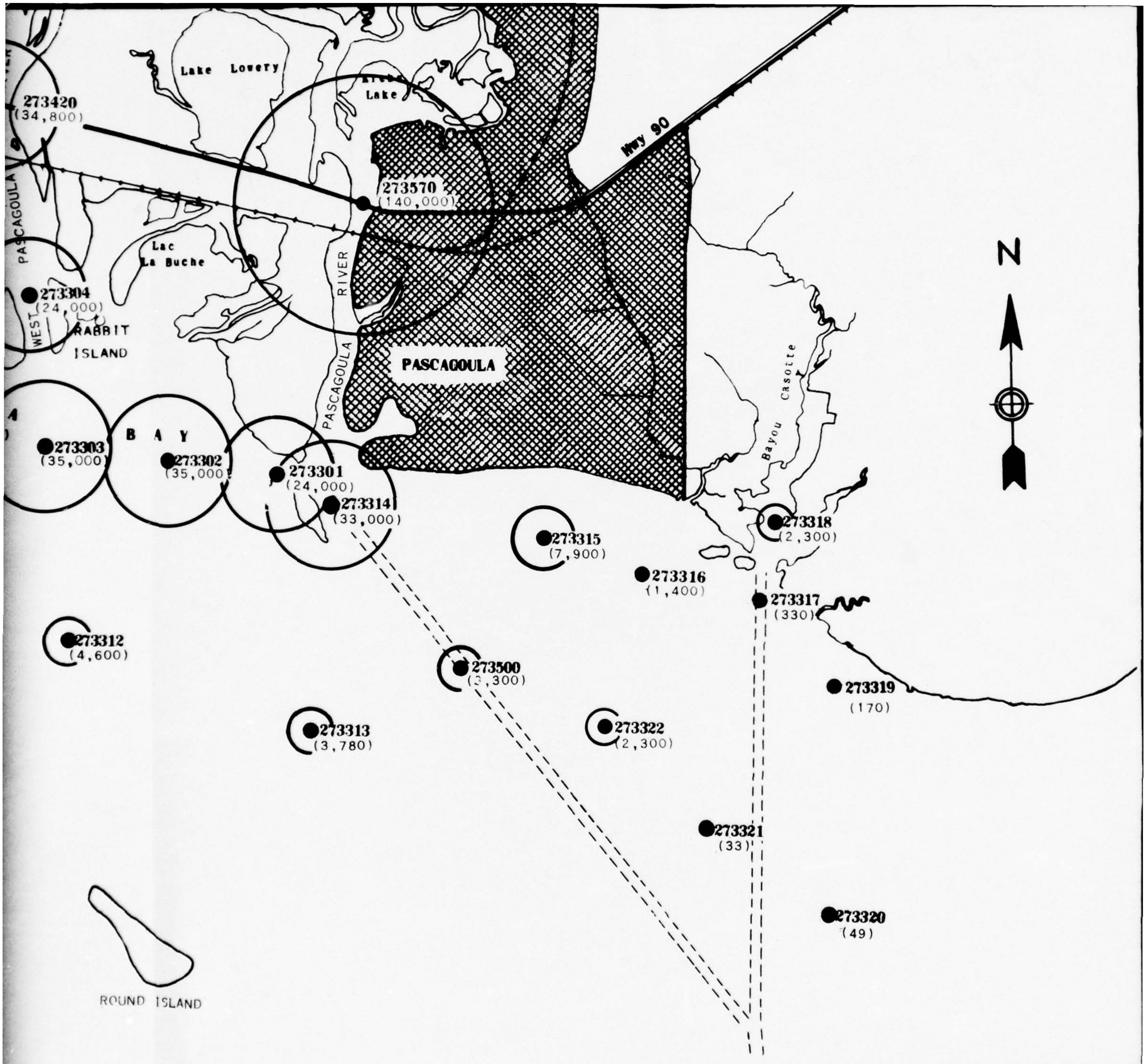
Exhibit 5



NOTES:

1 Area of circle proportional to median coliform density MPN/100 ml.

2 Number in parenthesis indicates median value of coliform density MP



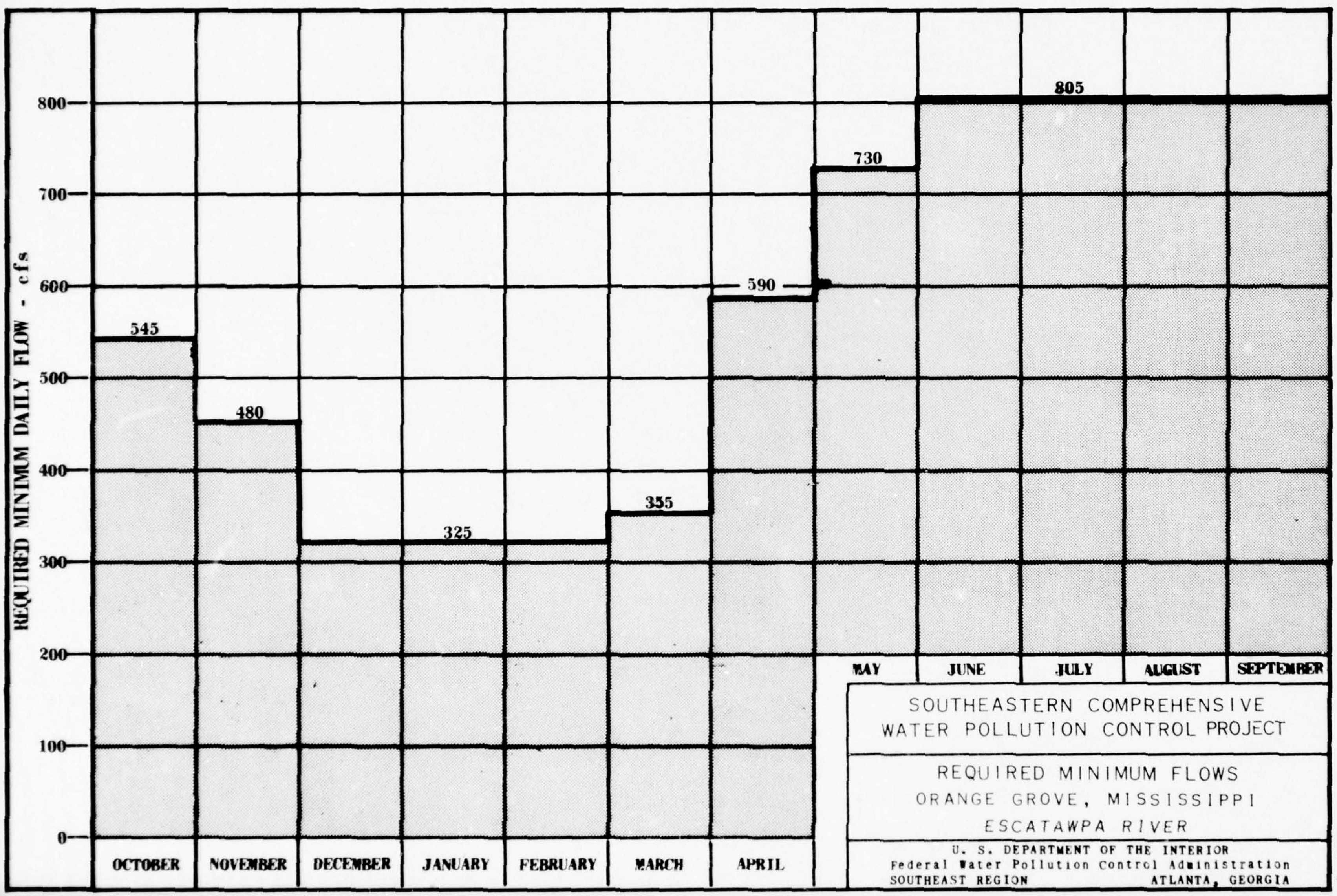
SOUTHEASTERN COMPREHENSIVE
WATER POLLUTION CONTROL PROJECT

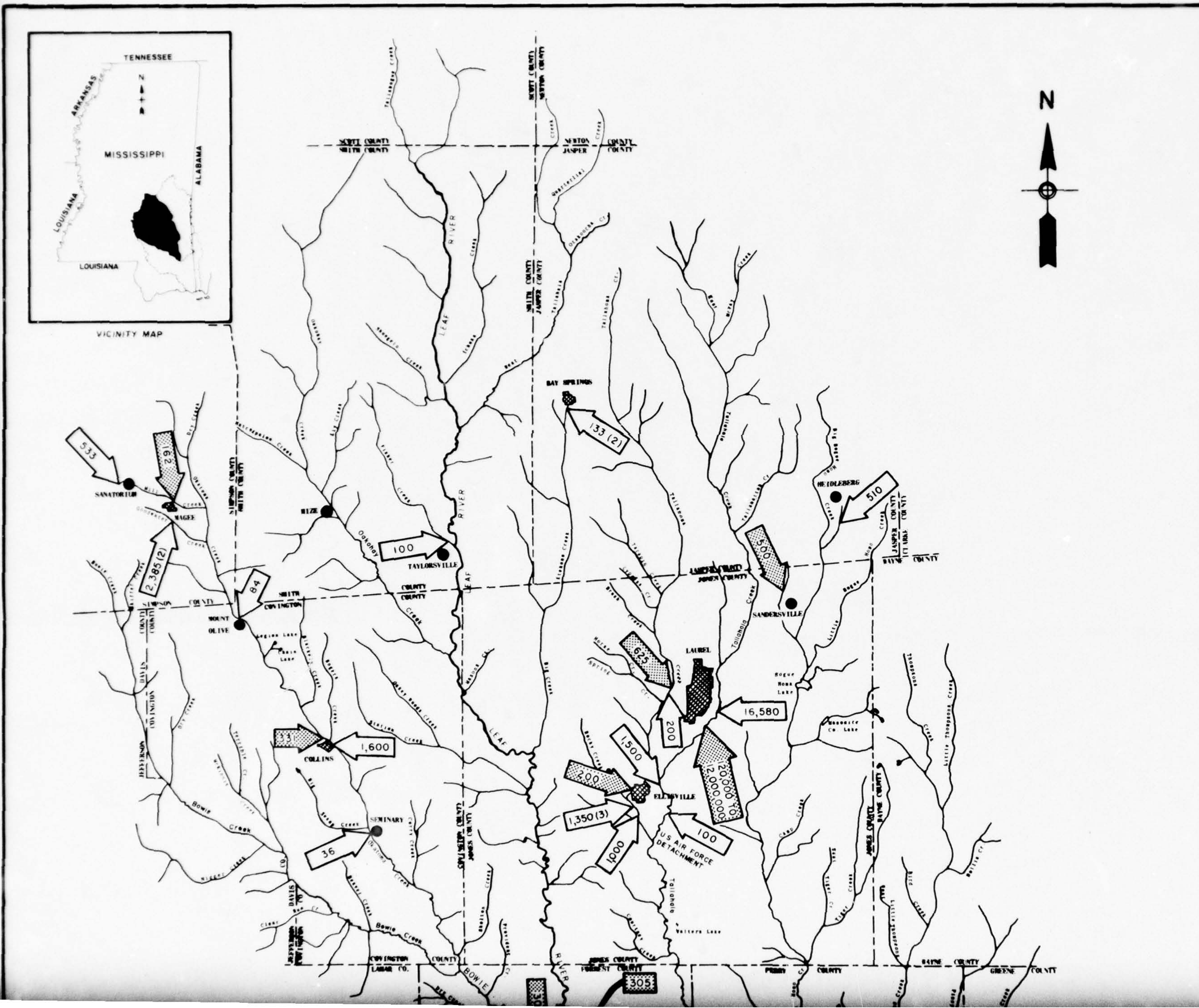
COLIFORM DENSITY
PASCAGOULA BAY AREA
FEBRUARY 1965

U. S. DEPARTMENT OF THE INTERIOR
Federal Water Pollution Control Administration
SOUTHEAST REGION ATLANTA, GEORGIA

ional to median coliform density MPN/100 ml.
indicates median value of coliform density MPN/100 ml.

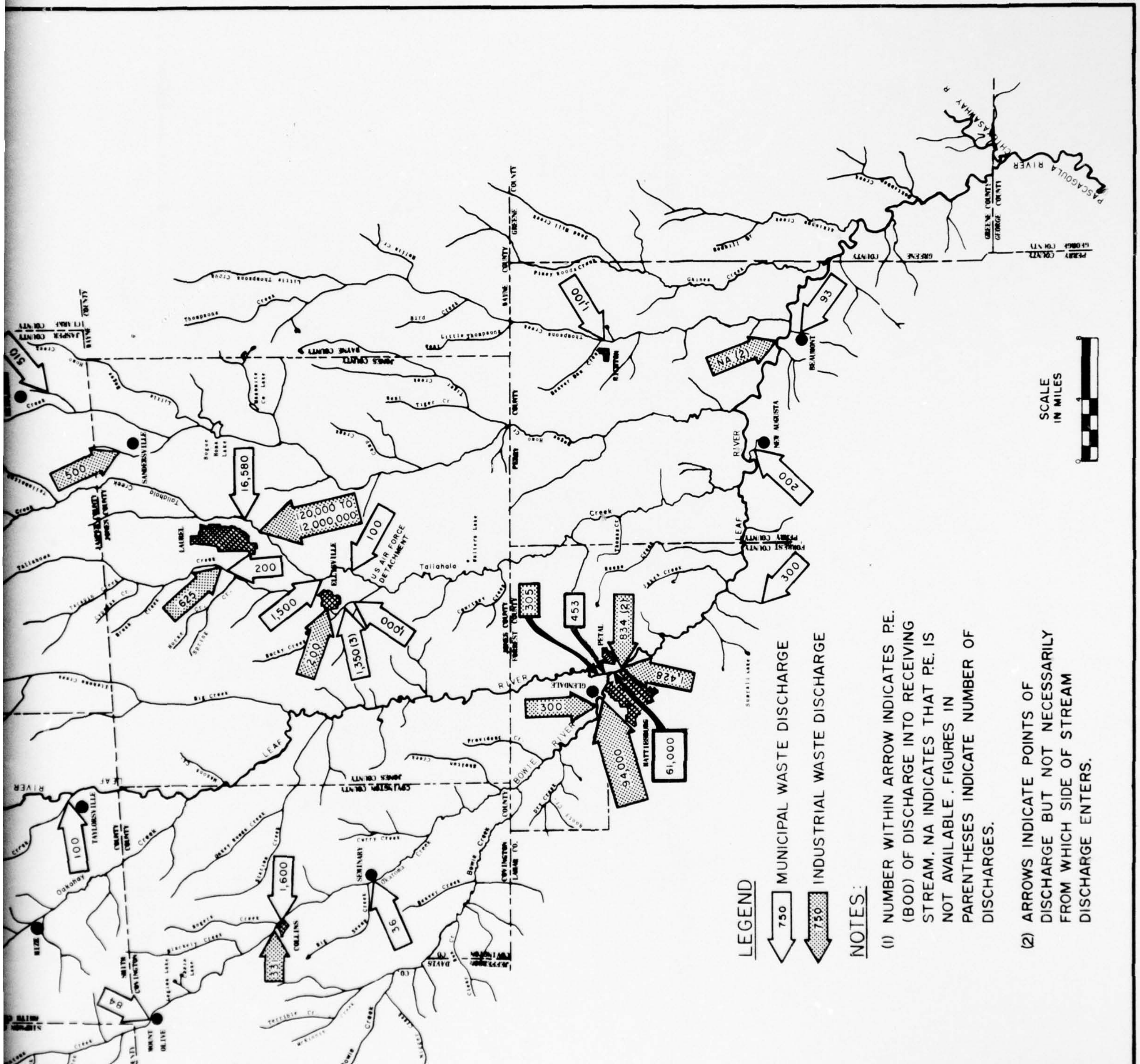
Exhibit 7


REQUIRED MINIMUM DAILY FLOW - cfs
0
100
200
300
400
500
600
700
800
545
480
325
355
590
730
805
OCTOBER
NOVEMBER
DECEMBER
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
SOUTHEASTERN COMPREHENSIVE
WATER POLLUTION CONTROL PROJECT
REQUIRED MINIMUM FLOWS
ORANGE GROVE, MISSISSIPPI
ESCATAWPA RIVER
U. S. DEPARTMENT OF THE INTERIOR
Federal Water Pollution Control Administration
SOUTHEAST REGION
ATLANTA, GEORGIA



TENNESSEE
ARKANSAS
MISSISSIPPI
ALABAMA
LOUISIANA
VICINITY MAP
N
LEAF RIVER
BAY SPRINGS
133 (2)
HEIDLEBERG
510
SANDERSVILLE
500
LAUREL
16,580
20,000 TO 2,000,000
200
625
ELLISVILLE
1,500
200
1,350 (3)
1000
100
U S AIR FORCE DETACHMENT
TAYLORSVILLE
100
MIZE
MOUNT OLIVE
84
SANATORIUM
533
MAGEE
162
2,385 (2)
COLLINS
1,600
SEMINARY
36
305

Exhibit 8



SOUTHEASTERN COMPREHENSIVE WATER POLLUTION CONTROL PROJECT

WASTE DISCHARGES
LEAF RIVER SUB-BASIN

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
SOUTHEAST REGION ATLANTA, GEORGIA

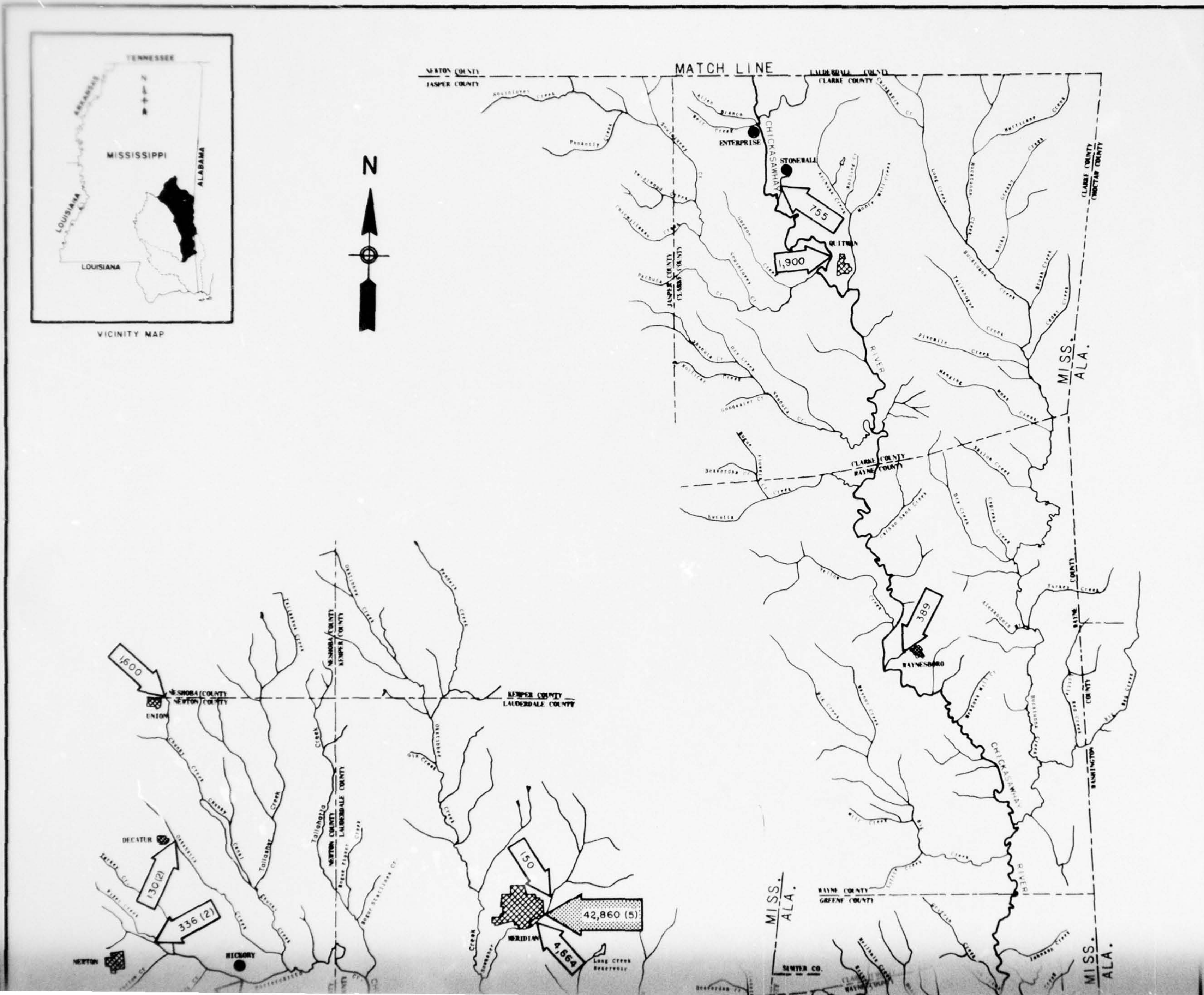
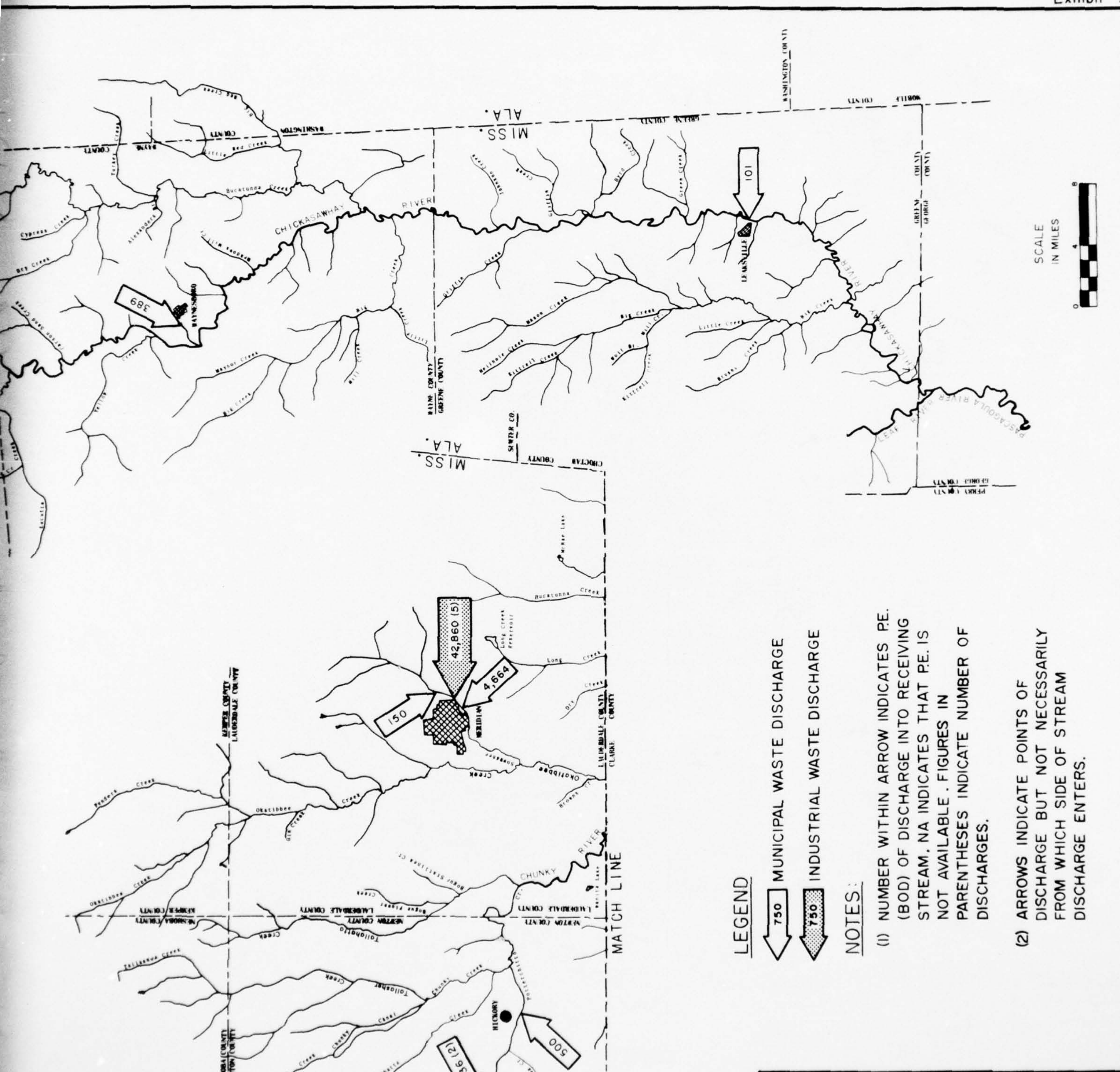

TENNESSEE
ARKANSAS
MISSISSIPPI
ALABAMA
LOUISIANA
VICINITY MAP
N
MATCH LINE
NEWTON COUNTY
JASPER COUNTY
LAUDERDALE COUNTY
CLARKE COUNTY
CHOCTAW COUNTY
ENTERPRISE
STONEWALL
CHICKASAWHAY
755
QUITMAN
1,900
RIVER
MISS.
ALA.
CLARKE COUNTY
WAYNE COUNTY
389
WAYNESBORO
WASHINGTON
WAYNE COUNTY
GREENE COUNTY
SUMTER CO.
1,600
NESHOBA COUNTY
NEWTON COUNTY
UNION
KEMPER COUNTY
LAUDERDALE COUNTY
DECATUR
130 (2)
336 (2)
NEWTON
HICKORY
150
42,860 (5)
4,664
MERIDIAN
Long Creek Reservoir

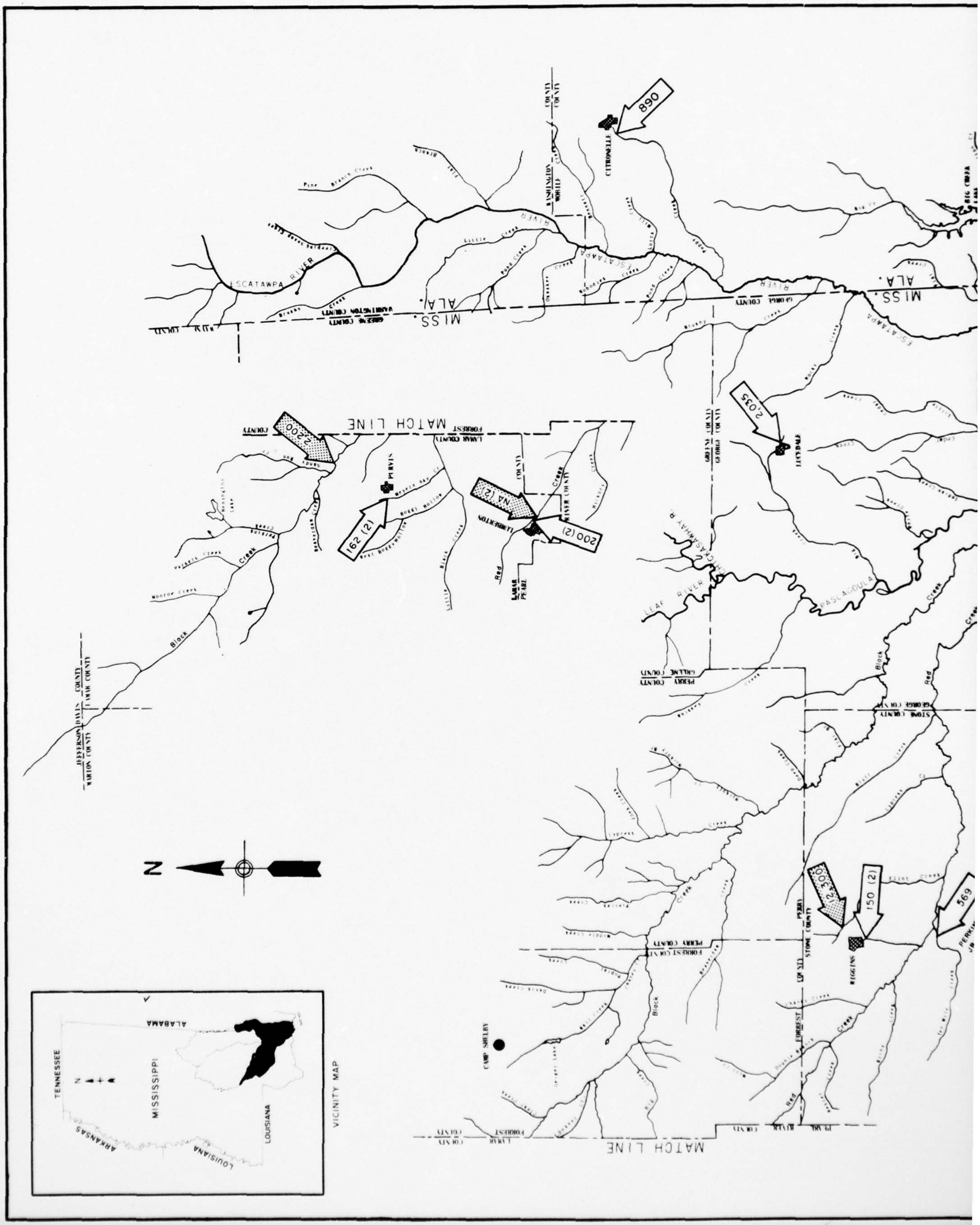
Exhibit 9



SOUTHEASTERN COMPREHENSIVE
WATER POLLUTION CONTROL PROJECT

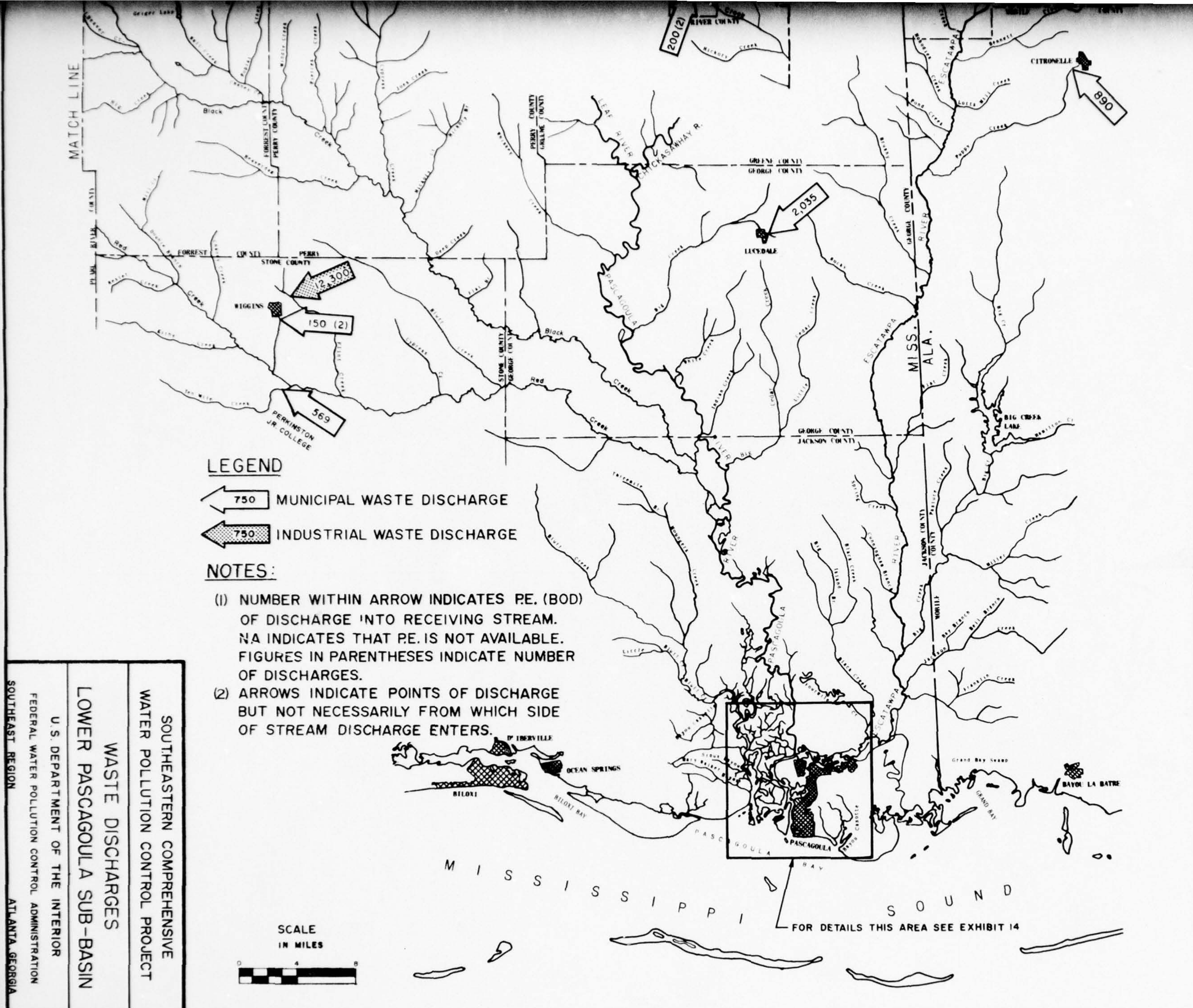
WASTE DISCHARGES
CHICKASAWHAY RIVER SUB-BASIN

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
SOUTHEAST REGION ATLANTA, GEORGIA



MISS.
ALA.
ESCATAWPA RIVER
MATCH LINE
890
CITRONELLE
2,035
LUCEDALE
2,200
PURVIS
162 (2)
NA (2)
200 (2)
LUMBERTON
LEAF RIVER
CHICKASAWHAY R.
PASCAGOULA
2,300
150 (2)
WIGGINS
569
CAMP SHELBY
N
TENNESSEE
MISSISSIPPI
ALABAMA
LOUISIANA
ARKANSAS
VICINITY MAP

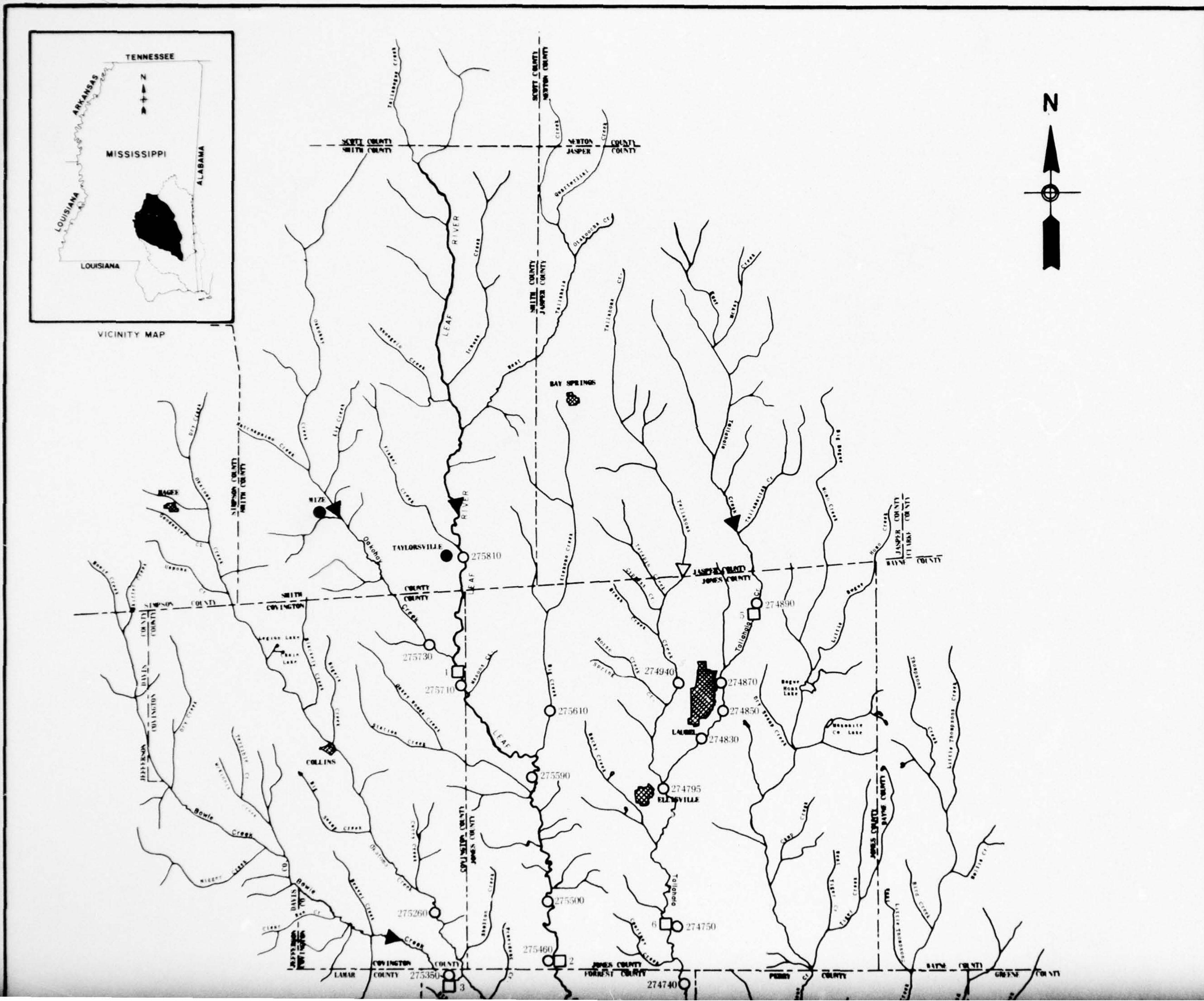
Exhibit 10



SOUTHEASTERN COMPREHENSIVE
WATER POLLUTION CONTROL PROJECT

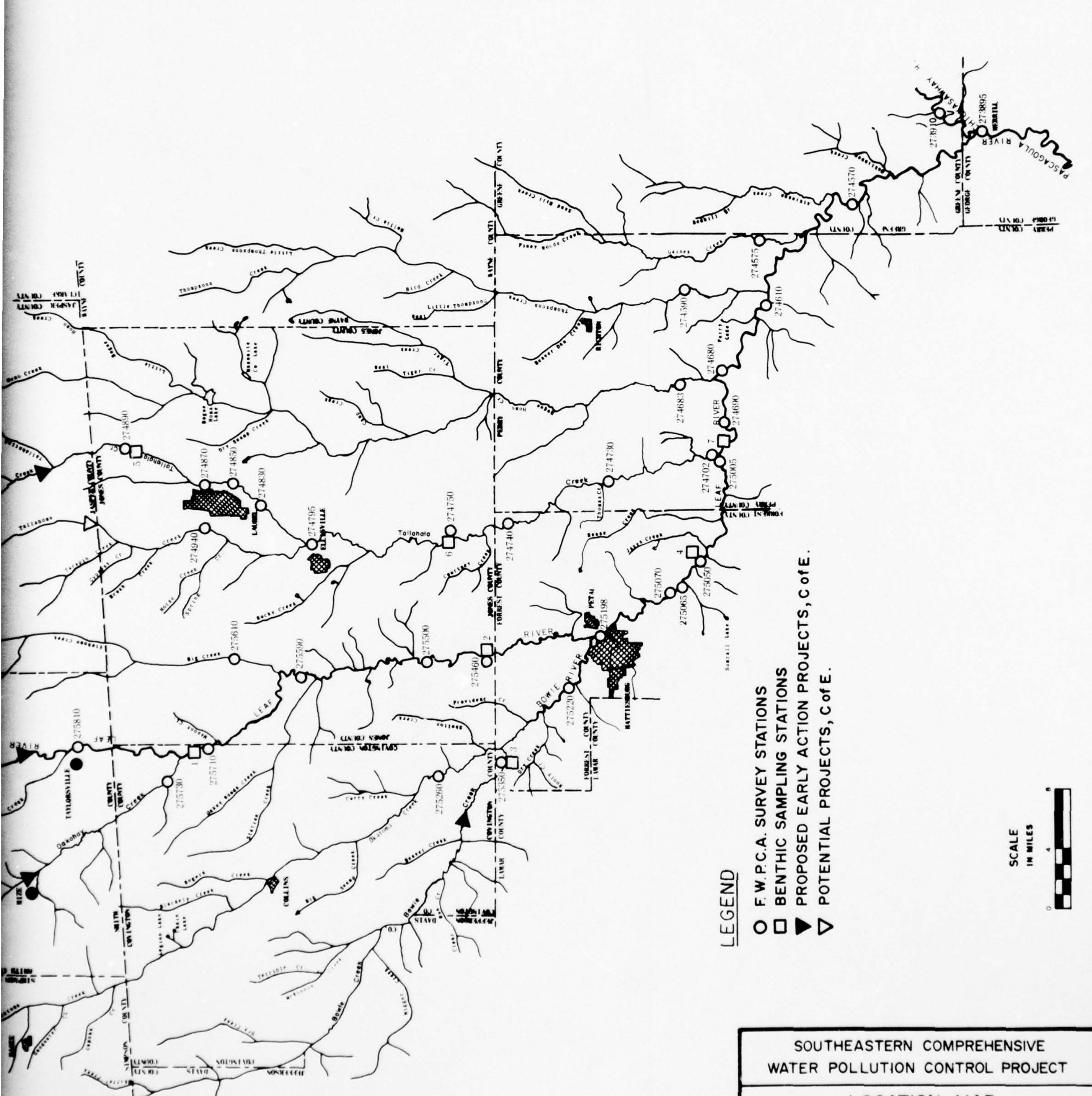
WASTE DISCHARGES
LOWER PASCAGOULA SUB-BASIN

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
SOUTHEAST REGION ATLANTA, GEORGIA



TENNESSEE
ARKANSAS
MISSISSIPPI
ALABAMA
LOUISIANA
LOUISIANA
VICINITY MAP
N
LEAF RIVER
SCOTT COUNTY
SMITH COUNTY
NEWTON COUNTY
JASPER COUNTY
BAY SPRINGS
WIZE
TAYLORSVILLE
MAGEE
COLLINS
LAUREL
ELLISVILLE
SIMPSON COUNTY
COVINGTON COUNTY
JONES COUNTY
WAYNE COUNTY
LAMAR COUNTY
FORREST COUNTY
PERRY COUNTY
GREENE COUNTY
Oakohay
Tallahala
Bowie Creek
275810
275730
275710
275610
275590
275500
275460
275350
275260
274940
274890
274870
274850
274830
274795
274750
274740
1
2
3
5
6

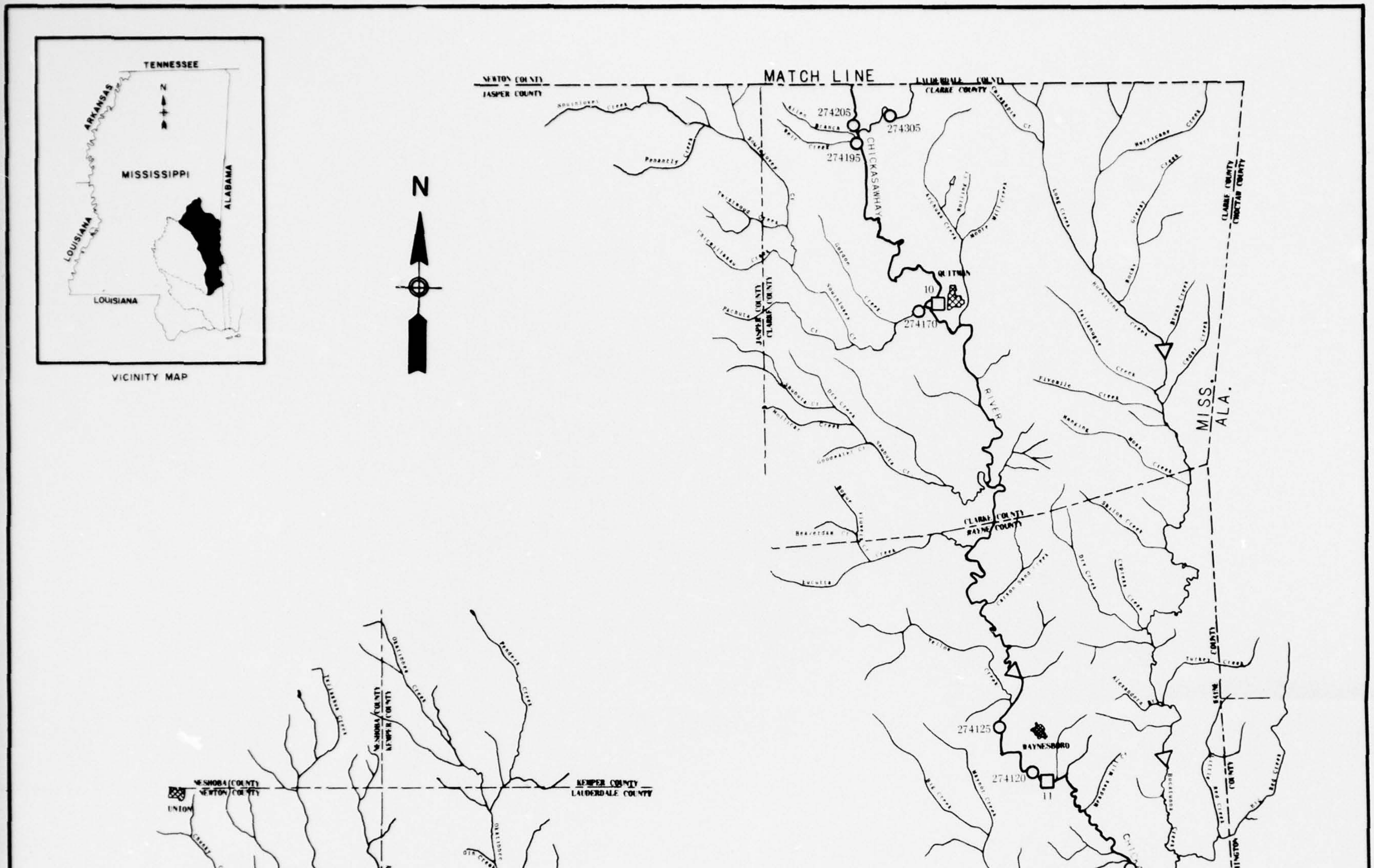
Exhibit 11



SOUTHEASTERN COMPREHENSIVE
WATER POLLUTION CONTROL PROJECT

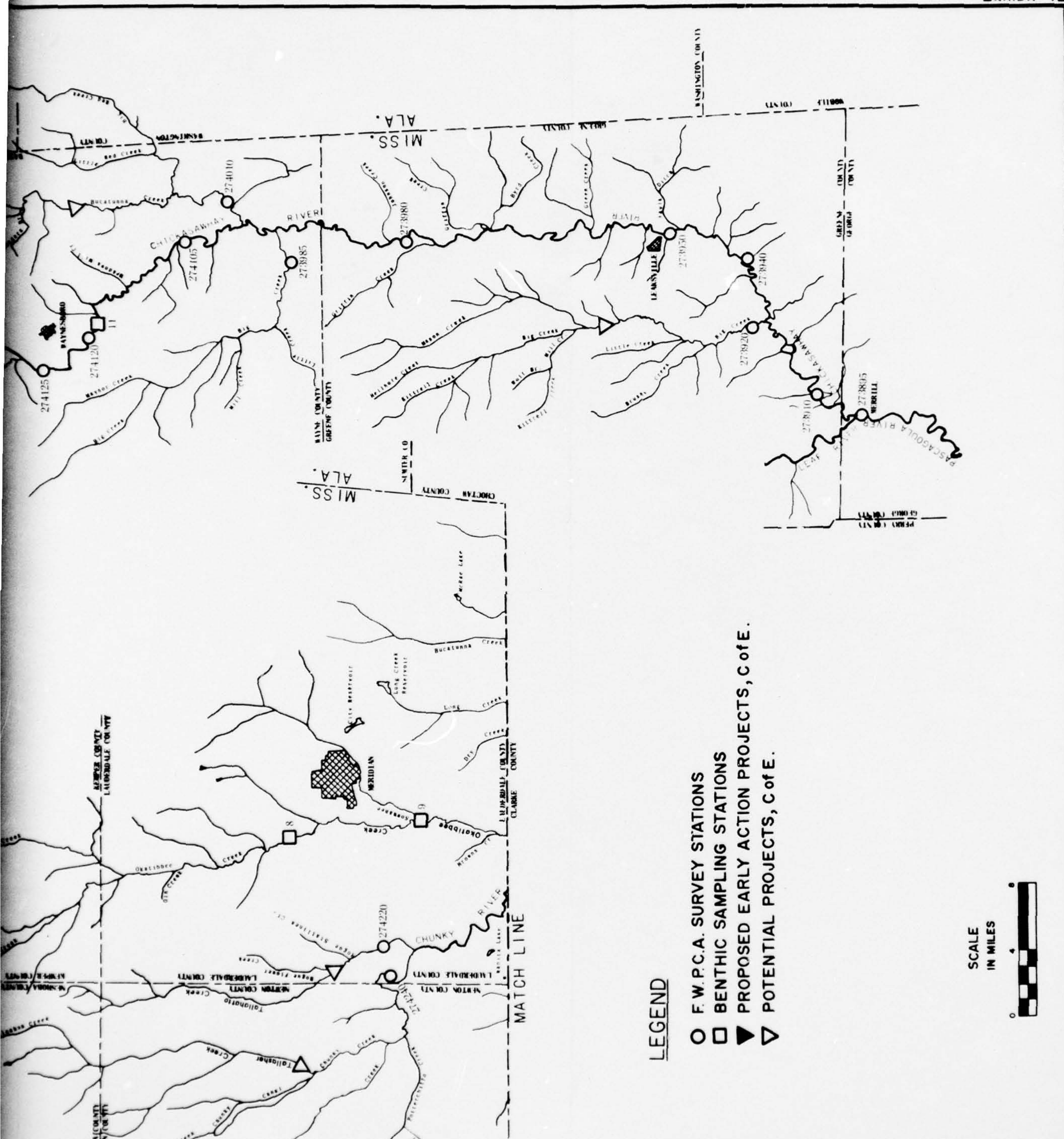
LOCATION MAP
LEAF RIVER SUB-BASIN

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
SOUTHEAST REGION ATLANTA, GEORGIA



TENNESSEE
ARKANSAS
MISSISSIPPI
ALABAMA
LOUISIANA
LOUISIANA
VICINITY MAP
N
MATCH LINE
NEWTON COUNTY
JASPER COUNTY
LAUDERDALE COUNTY
CLARKE COUNTY
CLARKE COUNTY
CHOCTAW COUNTY
JASPER COUNTY
CLARKE COUNTY
CLARKE COUNTY
WAYNE COUNTY
WAYNE COUNTY
GREENE COUNTY
NESHOBA COUNTY
NEWTON COUNTY
KEMPER COUNTY
LAUDERDALE COUNTY
NEWTON COUNTY
LAUDERDALE COUNTY
SUMTER CO
MISS.
ALA.
CHICKASAWHAY
RIVER
CHUNKY
QUITMAN
WAYNESBORO
MERIDIAN
UNION
DECATUR
NEWTON
274205
274305
274195
274170
274125
274120
274105
274010
273985
273980
274220
274240
10
11
8
9

Exhibit 12



SOUTHEASTERN COMPREHENSIVE
WATER POLLUTION CONTROL PROJECT

LOCATION MAP
CHICKASAWHAY RIVER SUB-BASIN

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
SOUTHEAST REGION ATLANTA GEORGIA

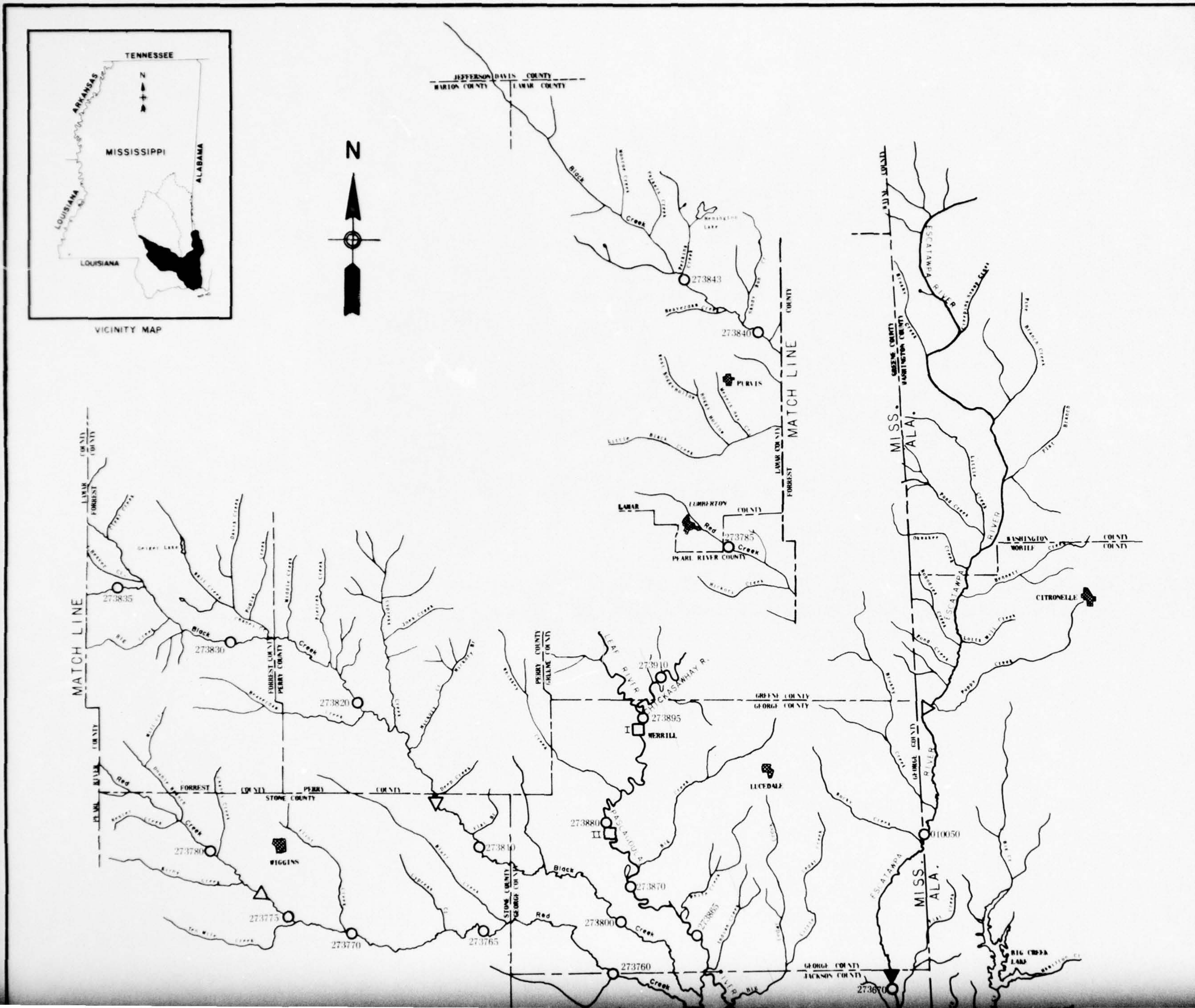
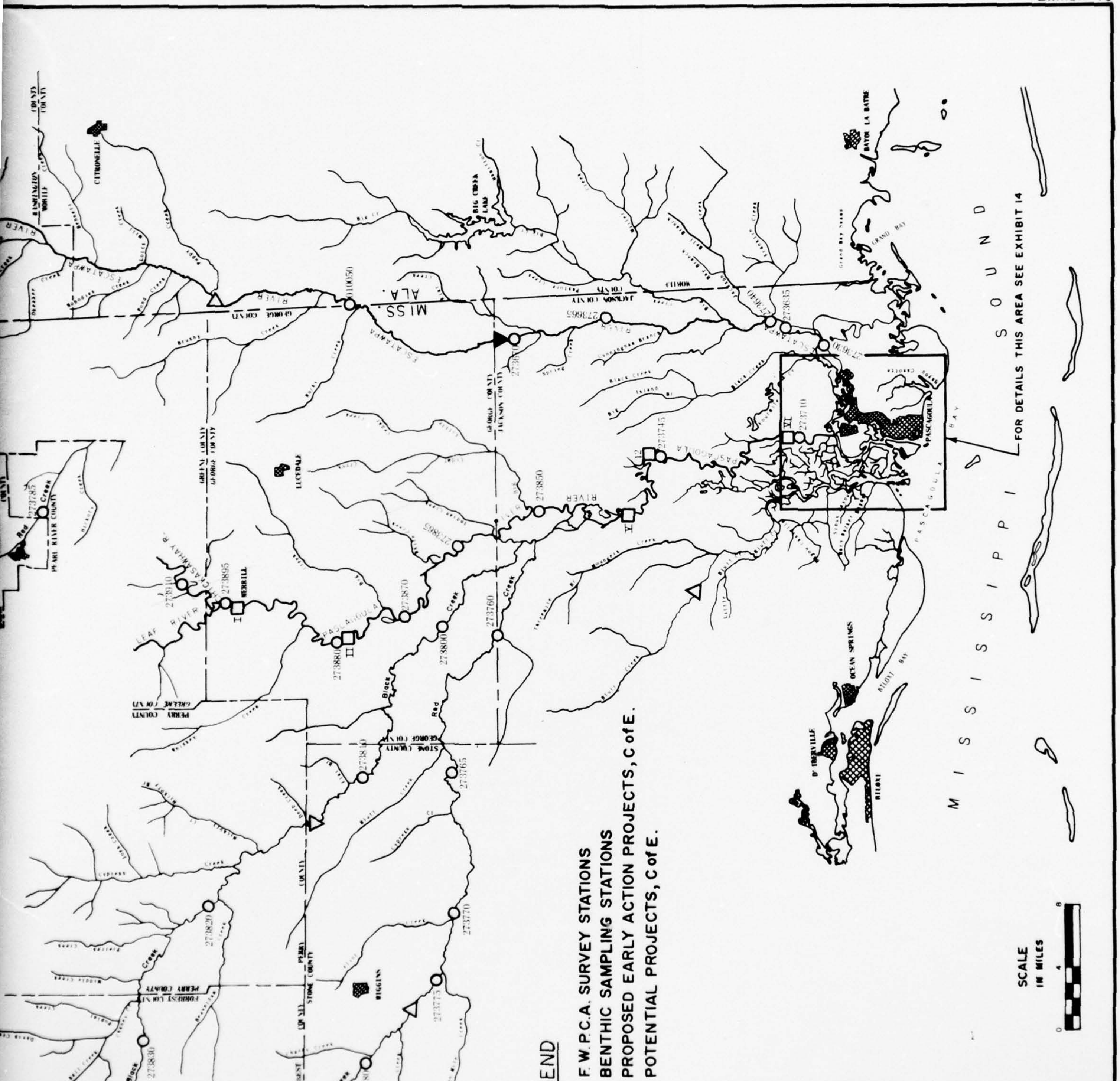

VICINITY MAP
TENNESSEE
ARKANSAS
MISSISSIPPI
ALABAMA
LOUISIANA
N
MATCH LINE
MISS.
ALA.
ESCATAWPA RIVER
Black Creek
Red Creek
LEAF RIVER
CHICKASAWHAY R.
PASCAGOULA
PURVIS
LUMBERTON
WIGGINS
LUCEDALE
MERRILL
CITRONELLE
BIG CREEK LAKE
JEFFERSON DAVIS COUNTY
MARION COUNTY
LAMAR COUNTY
FORREST COUNTY
PERRY COUNTY
GREENE COUNTY
GEORGE COUNTY
STONE COUNTY
JACKSON COUNTY
PEARL RIVER COUNTY
WASHINGTON COUNTY
MOBILE COUNTY
273843
273840
273785
273835
273830
273820
273910
273895
273880
273870
273865
273810
273800
273780
273775
273770
273765
273760
273670
010050
I
II

Exhibit 13



SOUTHEASTERN COMPREHENSIVE
WATER POLLUTION CONTROL PROJECT

LOCATION MAP
LOWER PASCAGOULA SUB-BASIN

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
SOUTHEAST REGION ATLANTA GEORGIA

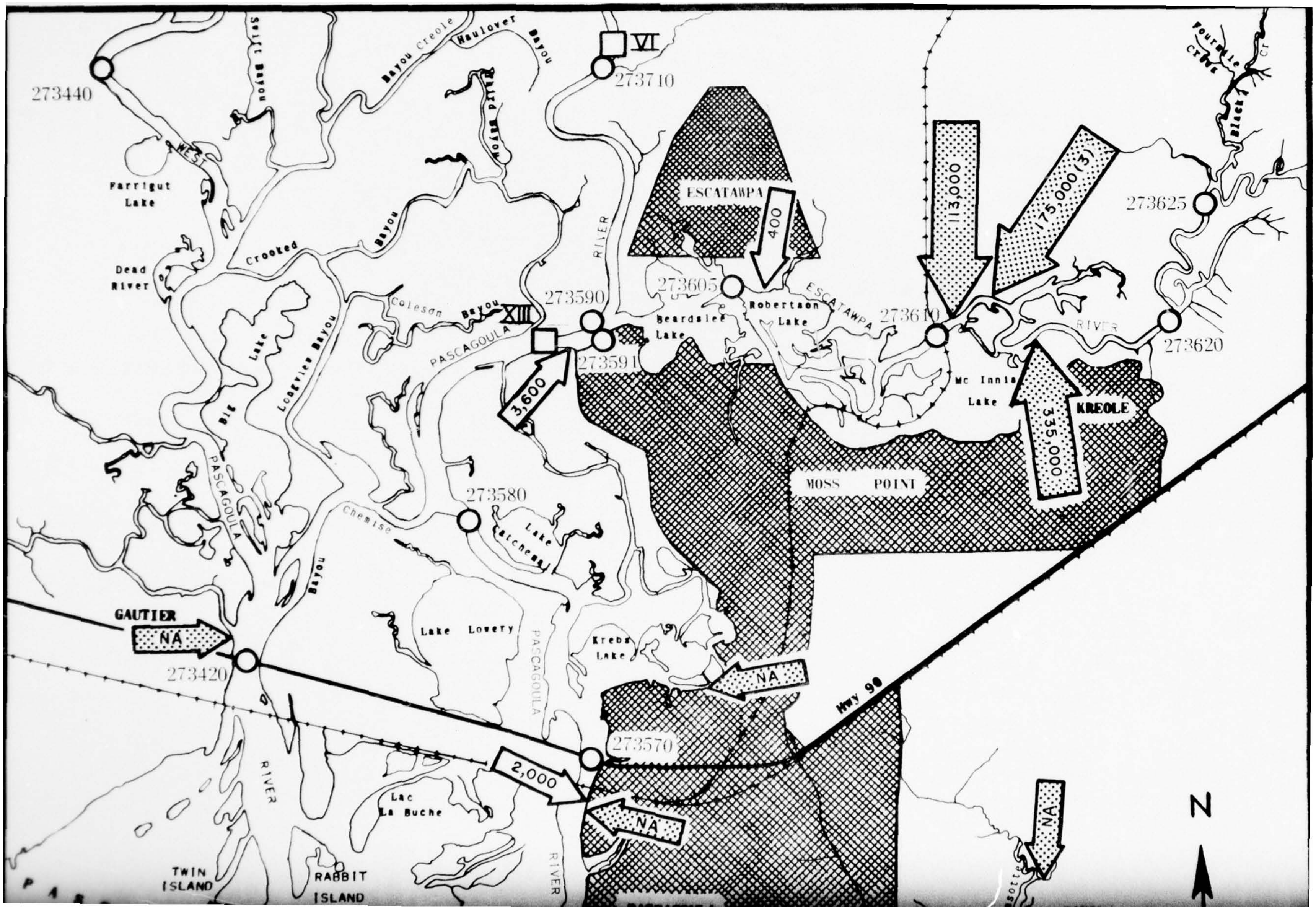
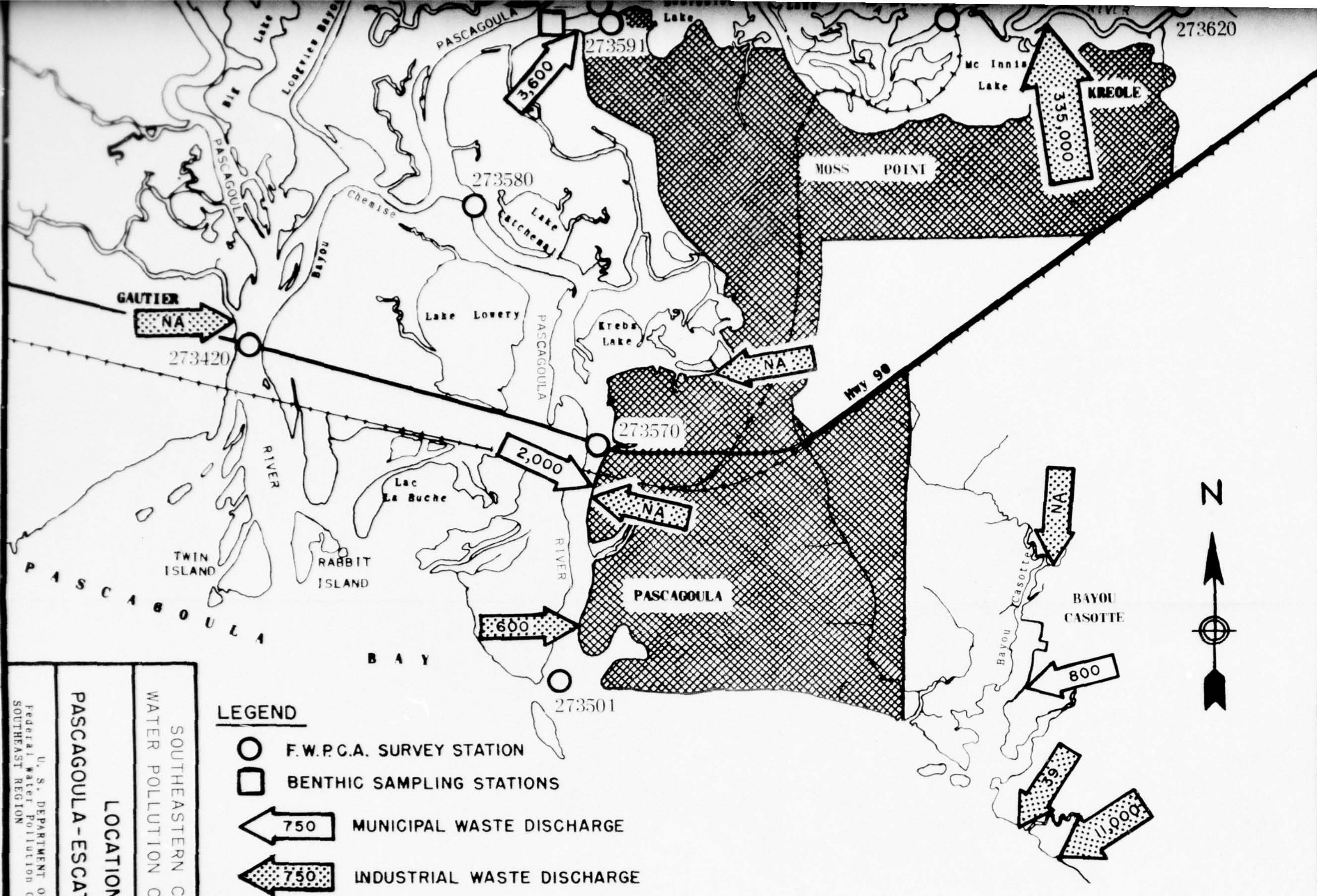

273440
273710
VI
Swift Bayou
Bayou Creole
Haulover Bayou
Farrigut Lake
WEST
Dead River
Crooked
Bayou
Big Lake
Longview Bayou
PASCAGOULA
Coleson Bayou
XIII
273590
273591
RIVER
ESCATAWPA
400
273605
Robertson Lake
Beardslee Lake
ESCATAWPA
113,000
175,000(3)
273610
273625
273620
RIVER
Mc Innis Lake
335,000
KREOLE
3,600
MOSS POINT
273580
Chemise
Lake Catcheag
Bayou
GAUTIER
NA
273420
Lake Lowery
PASCAGOULA
Krebs Lake
NA
Hwy 90
273570
2,000
NA
RIVER
Lac La Buche
TWIN ISLAND
RABBIT ISLAND
RIVER
NA
N

Exhibit 14



NOTES:

(1) NUMBER WITHIN ARROW INDICATES P.E. (BOD) OF DISCHARGE INTO RECEIVING STREAM. NA INDICATES THAT P.E. IS NOT AVAILABLE. FIGURES IN PARENTHESES INDICATE NUMBER OF DISCHARGES.

(2) ARROWS INDICATE POINTS OF DISCHARGE BUT NOT NECESSARILY FROM WHICH SIDE OF STREAM DISCHARGE ENTERS.

SOUTHEASTERN COMPREHENSIVE WATER POLLUTION CONTROL PROJECT

LOCATION MAP
PASCAGOULA-ESCATAWPA ESTUARY

U. S. DEPARTMENT OF THE INTERIOR
Federal Water Pollution Control Administration
SOUTHEAST REGION ATLANTA, GEORGIA

PASCAGOULA RIVER COMPREHENSIVE BASIN STUDY

APPENDIX H

A REPORT ON THE RECREATION ASPECTS OF THE PASCAGOULA RIVER BASIN MISSISSIPPI AND ALABAMA

Prepared by the Bureau of Outdoor Recreation,
Department of the Interior, as a contribution to the
Pascagoula River Comprehensive Basin Study

A REPORT

on the

RECREATION ASPECTS

of the

PASCAGOULA RIVER BASIN

MISSISSIPPI

and

ALABAMA

Prepared by

Department of the Interior
Stewart L. Udall, Secretary

Bureau of Outdoor Recreation
Southeast Region
810 New Walton Building
Atlanta, Georgia 30303

December 1967

AD-A036 710 FEDERAL WATER POLLUTION CONTROL ADMINISTRATION ATLANTA GA F/G 8/6
PASCAGOULA RIVER COMPREHENSIVE BASIN STUDY. VOLUME VI. APPENDIX--ETC(U)
FEB 67

UNCLASSIFIED NL

3 OF 5
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SYLLABUS

The Comprehensive Study of the Pascagoula River Basin was authorized in 1961 by the Committee on Public Works of the United States Senate and Committee on Public Works of the United States House of Representatives. This report, prepared by the Bureau of Outdoor Recreation, presents relevant information concerning outdoor recreation activities in the Pascagoula River Basin in the format of a comprehensive outdoor recreation plan for the basin. The plan has been prepared with the close cooperation of various Federal agencies, the Alabama and Mississippi State governments, and local governmental units.

The report includes an estimate of the existing and projected demand, supply, and needs for outdoor recreation for the years 1965, 1980, and 2015.

In the past few years, the economic growth rate and the expanding population of the Pascagoula River Basin and the outlying Standard Metropolitan Statistical Areas have increased the demand for outdoor recreation resources and facilities far beyond the existing and programmed supply of such resources and facilities.

Projection of income and population to the years 1980 and 2015 shows that the gap between demand for outdoor recreation resources and facilities and the supply of such facilities is widening. The greatest need of the population, however, is for water areas capable of satisfying the demand for water-based and water-oriented outdoor recreation activities.

To take care of the existing and projected demand for water-based and water-oriented outdoor recreation activities, extensive recreational development on proposed water impoundments in the river basin is recommended. It is believed that with such development, accompanied by pollution abatement, stream improvement, improvement of existing areas and facilities and greater public access to the mouth of the Pascagoula River, the existing and the projected need for outdoor recreation activities in the Pascagoula River Basin recreation market area can be met.

TABLE OF CONTENTS

LIST OF CHARTS

LIST OF CHARTS (Cont'd)

LIST OF CHARTS (Cont'd)

LIST OF PHOTOGRAPHS

PART I. INTRODUCTION

AUTHORITY

The Bureau of Outdoor Recreation is authorized and directed to engage in water and related land resources programs through an Act of Congress of May 28, 1963 (Public Law 88-29, 77 Stat. 49). More recent legislation; namely, the Federal Water Project Recreation Act (Public Law 89-72, 79 Stat. 216), requires that the views of the Secretary of the Interior, with respect to outdoor recreation aspects, be set forth in any report on any project or appropriate unit thereof within the privisions of the Act.

Outdoor recreation planning in conjunction with river basin studies is consonant with the overall objectives of Senate Document 97 ("Policies, Standards and Procedures in the Formulation, Evaluation and Review of Plans for Use and Development of Water and Related Land Resources"), published May 29, 1962, by the 87th Congress, 2nd Session.

PURPOSE

The purpose of this recreation study is to investigate and evaluate existing and potential outdoor recreation resources within the Pascagoula River Basin study area which do now or may in the future provide outdoor recreation opportunities, and to assist in the formulation and evaluation of water and related land resource development projects included in early-action and potential long-range programs.

Essentially, the purpose of this study is to develop elements of a comprehensive plan which will assure optimum utilization of resources within the basin to meet identified recreation needs.

SCOPE

This study includes a comprehensive inventory of existing public use outdoor recreation areas within the study area, and identifies and evaluates potential resources and developments which may in the future provide outdoor recreation opportunity.

Consideration is given to the active recreation use of developed resources, and to the preservation, protection, and possible rehabilitation, enhancement or development of open spaces, forests and woodlands, wetlands, rivers, lakes and other water bodies, as well as areas of natural beauty, historical and scientific values.

The study evaluates the present types of recreation activities and the extent of participation, analyzes problems and factors affecting the interaction between demand and existing use, and projects future

outdoor recreation demands by selected activities and groups of related activities. Needs for land and water areas, and facilities to accommodate these anticipated demands, have been estimated.

The activities have been grouped into three categories of: (1) those dependent on water, (2) those enhanced by water, and (3) all other activities. The public sector includes all known Federal, State, and municipal outdoor recreation areas in the basin study area. The private sector includes only presently available information that relates to resource supply and needs calculations.

BACKGROUND

The comprehensive study of the Pascagoula River Basin was authorized by two resolutions adopted March 14, 1961, by the Committee on Public Works of the United States Senate and subsequent resolutions adopted June 7, 1961, and August 15, 1961, by the Committee on Public Works of the U.S. House of Representatives. The studies authorized by the above resolutions were initiated early in fiscal year 1963 and shortly after inception were converted to a comprehensive river basin Type II study with a program for participation by the Bureau of Outdoor Recreation. The Bureau of Outdoor Recreation commenced its pariticpation in the study in January 1963.

PLANNING CONCEPT, BASIC ASSUMPTIONS, AND DEFINITIONS

Planning Concept - The Bureau's planning approach is based on the concept that the aim of water and related land resource programs is to satisfy human needs and desires. Outdoor recreation, possessing both tangible and intangible values, is considered to be a desirable product of water and related land resource programs.

Basic Assumptions - Basic assumptions are as follows:

1. With the exception of fishing and hunting, basin participation rates for outdoor recreations activities will be the same as those derived from participation data in Outdoor Recreation Resources Review Commission (ORRRC) Report No. 19. Hunting and fishing participation rates were determined by the Bureau of Sport Fisheries and Wildlife, based on the 1960 National Hunting and Fishing Survey.

2. Such participation rates bear a direct relationship to personal income and can be adjusted according to per capita income variables for local areas.

3. Participation rates from ORRRC Report No. 19, which refers to population "12 years and older," may be applied to total populations since much of the outdoor recreation activity involves an entire family with all members occupying space and utilizing facilities.

4. Population and per capita personal income projections will follow the pattern developed in the Economic Base Study for the Pascagoula, Pearl, and Big Black study area.

5. Eighty percent of the outdoor recreation demand will initiate from within the Pascagoula River Basin and from designated Standard Metropolitan Statistical Areas.

Definitions - The following terminology is employed in this report:

1. Activity occasion - The participation by one person in one activity in 1 day. If a person participates in three different activities in 1 day, it is counted as three activity occasions.

2. Average summer Sunday demand - The average amount of participation in a given outdoor recreation activity on a normal summer Sunday. Calculated on a 13-week summer basis with 40 percent of weekly recreation for activities other than camping assumed to occur on Sunday. For camping, 75 percent of the weekly use is assumed to occur on Saturday and Sunday.

3. Comprehensive - When used with "outdoor recreation," it refers to all recreation activities dependent upon outdoor environment. When used with "river basins," it refers to multiple-purpose investigation.

4. Outdoor recreation - Leisure time activities which utilize an outdoor setting.

5. Outdoor recreation activity - A specific leisure time action or pursuit in an outdoor environment.

6. Outdoor recreation resources - Land and water and associated natural and manmade resources which provide, or may in the future provide, opportunities for outdoor recreation. Included in associated resources are fish and wildlife which serve recreation activities and man-made facilities to allow access and use of natural resources.

7. Programmed - Refers to an approved and financed schedule of events directed toward effectuating a given outdoor recreation development plan or project within the forthcoming 5-year period.

8. Recreation area - A land or water area administered as a unit for outdoor recreation.

9. Recreation day - A standard unit of use consisting of a visit by one individual to an outdoor recreation development or area for recreation purposes during any significant portion or all of a 24-hour day period measured from midnight.

10. Recreation demand - A measurement of the amount and kinds of outdoor recreation opportunities or facilities which the public desires, expressed in terms of activity occasions and recreation days.

11. Recreation facilities - Those manmade improvements provided to enhance or make possible recreation use.

12. Recreation Market Area - The area from which approximately 80 percent of the people are drawn on 1-day outings or a weekend trip, or both, to the program or project area under consideration.

13. Recreation needs - Unsatisfied demands translated into resource requirements in terms of land, water, and facilities.

14. Recreation supply - The capacity of resources and facilities capable of providing outdoor recreation opportunities expressed in terms of activity occasions.

15. Related land - That land on which present or projected use or management practices cause significant effects on the quantity and/or quality of the water resources and that land the use or management of which is significantly affected by or depends on existing and proposed measures for management, development, or use of water resources.

16. Site - A tract of land within a recreation area designated for a particular activity.

17. Summer - The summer period is considered to be the months of June, July, and August, or 13 weeks.

18. Unsatisfied demand - The difference between outdoor recreation demand and the capacity of existing and programmed facilities, expressed in activity occasions.

PLANNING CRITERIA

Average Summer Sunday Demand - The average summer Sunday demand is an important planning criteria because it is the basis for computation of the design needs at a project. Average summer Sunday demand for all activities except camping is computed by dividing the summer demand for each activity by 13 (based on a 13-week summer) and multiplying by .40 to determine the Sunday demand. In the case of camping, the weekly demand is multiplied by .75. Facility needs for the various activities are then computed by applying the following criterion.

Camping Capacity - In acquiring land for camping areas, it is necessary to make allowances for access roads, parking space, washrooms, and other facilities, and unusable land to be left in its natural state. It is, therefore, reasonable to plan on no more than one campsite per acre

of undeveloped land. The camping capacity of fully usable and developed land is based on five persons per family unit and three family units per acre.

Picnic Capacity - Daily picnic capacity is based on five persons per table and seven tables per developed acre. A turnover of two per table is regarded as a reasonable figure and corresponds to the experience of the Corps of Engineers at their reservoirs. It should be noted that the above figures assume the use of highly suitable land. To allow for a moderate amount of unusable land and access areas, a figure of two tables per acre might be used for land acquisition. Computation of picnic activity occasions per developed acres is accomplished by multiplying the total number of persons and tables per acre by the rated turnover (5 persons x 7 tables x 2 = 70 picnic activity occasions per developed acre)-- for acquisition of undeveloped land, 5 persons x 2 tables x 2 = 20 picnic activity occasions per undeveloped acre.

Boating Capacity - Daily boating capacity is based on the criterion of one boat per 6 acres of water, with an average party of three persons per boat. For planning purposes, no turnover factor is employed since it is assumed that seasonal and daily variations affecting boat use (such as early morning and spring or fall fishing) would tend to balance cyclic demand periods when a turnover factor would normally be employed. Individual site characteristics, however, might require the use of the turnover factor for special areas.

Boat Launching Areas - Boat ramps with their associated parking, access and maneuvering space should be planned on the basis of 2 acres of undeveloped land per ramp. This would allow for unsuitable topographic features and a limited amount of landscaping. In terms of fully usable land, 1 ramp unit with parking for 40 cars with trailers will require approximately 1 acre. There should be a launching ramp for each anticipated 40 cars with boat trailers on the average summer Sunday.

Swimming Areas - Swim sites require 1 acre of parking and 1 acre of beach and water for each 200 swimmers. Turnover of swimmers is thought to be three per day. On the basis of these figures, each acre of beach/water will support:

3 x 200 = 600 activity occasions per day.

ACKNOWLEDGEMENTS

Data on existing supply were obtained through several sources, primarily from Nationwide Inventory Forms 8-73, which were completed and submitted by the following agencies: Mississippi Game and Fish Commission, Mississippi State Park Commission, U.S. Forest Service, and the Choctaw Indian Agency. The Area Redevelopment Administration

contributed by making available their publication "Overall Economic Development Program" for many of the counties within the basin. Also, information furnished by various chambers of commerce and data supplied by the National Association of Conservation Districts were utilized where possible. The Governor's designated BOR Liaison Officer in Mississippi was the focal point for the inventory which provided most of the above data. Information on programmed and potential projects was furnished by the Corps of Engineers, Soil Conservation Service, Pat Harrison Waterway District, the Forest Service, and the State agencies mentioned above.

Projections of population and incomes for the basin are based on data developed for interagency use by the Corps of Engineers in its "Economic Base Study of the Pascagoula, Pearl, and Big Black Study Area."

Outdoor recreation demand estimates, present and future, are based upon the Bureau of Outdoor Recreation, Southeast Regional Office, methodology which has been developed to consider factors of particular importance and concern to the Southeast Region. The University of Southern Mississippi, under contract to the Bureau of Outdoor Recreation, furnished current use evaluations for several areas in the basin. These were utilized in this report to the extent possible.

Other Federal government agencies assisting in field surveys were the Bureau of Sport Fisheries and Wildlife, Soil Conservation Service, Corps of Engineers, and the Federal Water Pollution Control Administration.

PART II. GENERAL DESCRIPTION

PHYSICAL

The Pascagoula River Basin is located in southeastern Mississippi and southwestern Alabama. The area drained by the Pascagoula system extends from the North Central Hills country near Meridian, Mississippi, to the Mississippi Sound, a distance of about 170 miles. The basin extends laterally from the Tombigbee-Mobile River divide in Alabama westward to the Pearl River divide in central Mississippi, a distance of about 80 miles. (See Chart 1.)

The two major tributaries of the Pascagoula are the Leaf and the Chickasawhay Rivers. The Leaf River rises on the Jackson Prairie in the northwestern part of the basin and flows southeastward past the city of Hattiesburg. The headwaters of the Chickasawhay are in the North Central Hills area a few miles northwest of the city of Meridian. The Chickasawhay flows southwestward to its confluence with the Leaf a short distance upstream from the town of Merrill. At this confluence, the Pascagoula River is formed; it then flows in a southeastward course to its mouth on the Mississippi Sound, a few miles west of the Alabama State line.

CHART 1

Pascagoula River Basin
Relative Location

The Escatawpa River is another important stream that lies within the basin. This stream rises in southwestern Alabama but flows into Mississippi near the town of Agricola. From there it flows southward and forms a common estuary with the Pascagoula River near the town of Moss Point.

The network of streams and rivers that make up the Pascagoula River Basin is a major part of the basin's outdoor recreational resource. This fresh-water resource together with associated land areas will play a major role in meeting the recreational needs of the resident and visiting population.

Physiographic Character - A physiographic cross section along the longitudinal axis of the basin reveals an interesting association of land forms which characterize most of the Gulf Coastal Plain of the United States. (See Chart 2.)

By and large, the streams have entrenched themselves in transverse courses to the terraces and cuestas that generally parallel the Gulf Coast.

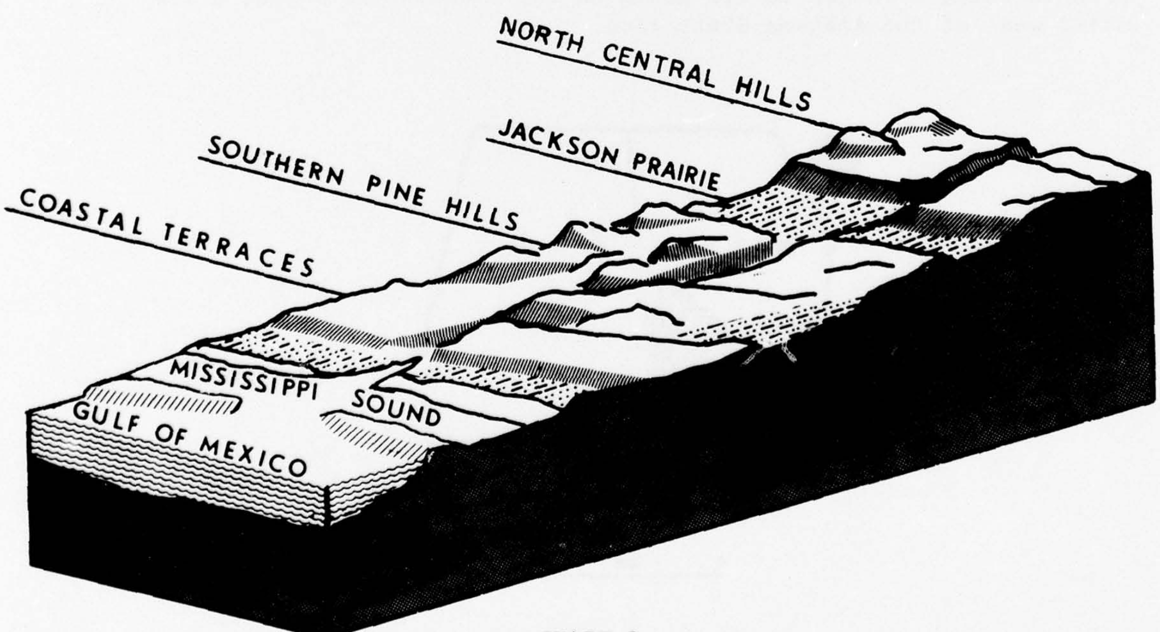


CHART 2

Pascagoula River Basin
Generalized Cross Section

Elevations range from sea level at the mouth of the Pascagoula River to nearly 700 feet near the headwaters of the Chickasawhay River in the North Central Hills country. Stream erosion patterns in the northern section of the upland are generally mature. The larger streams cross the parallel cuesta belts in wide-bottomed, steep-sided valleys 100 to 300 feet deep, thus forming rugged stream borderlands and more gently rolling interfluve areas. These varied topographic characteristics provide opportunities for a great number of outdoor recreational activities capable of satisfying the diverse needs of the basin's recreating public.

Vegetation and Soils - The climatic energy, exhibited in both heavy rainfall and long seasons of warm weather, has induced an abundant vegetative cover of forests and, in some cases, grasses.

In the Pascagoula Basin, coniferous forests usually occupy the sandy, droughty uplands of the North Central Hills and the Southern Pine Hills sections, while deciduous broadleaf species are characteristic of the stream bottomlands. The Jackson Prairie is underlain by easily decomposed limestone marls which, because of soil peculiarities, originally had a grass rather than a tree cover and developed a highly productive soil.

Recreation developments in some parts of the basin may be restricted because certain soils cannot withstand heavy use. Before specific sites for future developments are selected, a careful examination of soil and vegetative factors should be made. This examination should take into account the activities planned for the area as well as the expected intensity of use.

Climatic Conditions - The climate of the Pascagoula Basin is the humid subtropical type and is characteristic of most of the Southeastern United States. Days in summer are not only hot and sultry, but the nights are oppressive as well. The humid atmosphere with a high percentage of cloud cover does not permit the rapid loss of heat that is common in dryer regions. The slower rate of cooling during the night results in relatively small daily temperature ranges.

Winters in the basin are likewise relatively mild. Cool-month temperatures usually average between 40 and 55 degrees. The basin area receives warm, humid, tropical air from the Gulf of Mexico in winter, but the normal seaward pressure gradient of that season makes progress of such tropical air inland a more sporadic thing than in summer. This temperature-pressure relationship results in a pleasantly warm winter climate along the coastal margin. (See Chart 3.)

This natural phenomena extends the outdoor recreation and tourist season through the winter months. Cities on the coast have developed an attractive winter tourist service industry in response to the pleasant winter and warm coastal waters and each year draw thousands of visitors from the colder northern areas.

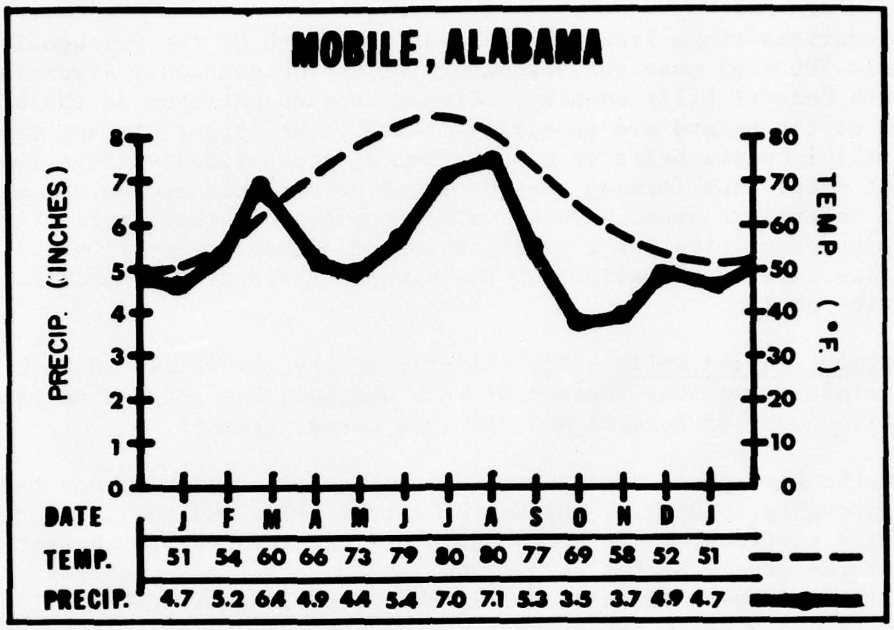


CHART 3

Pascagoula River Basin
Average Monthly Temperature and Precipitation at Mobile, Alabama

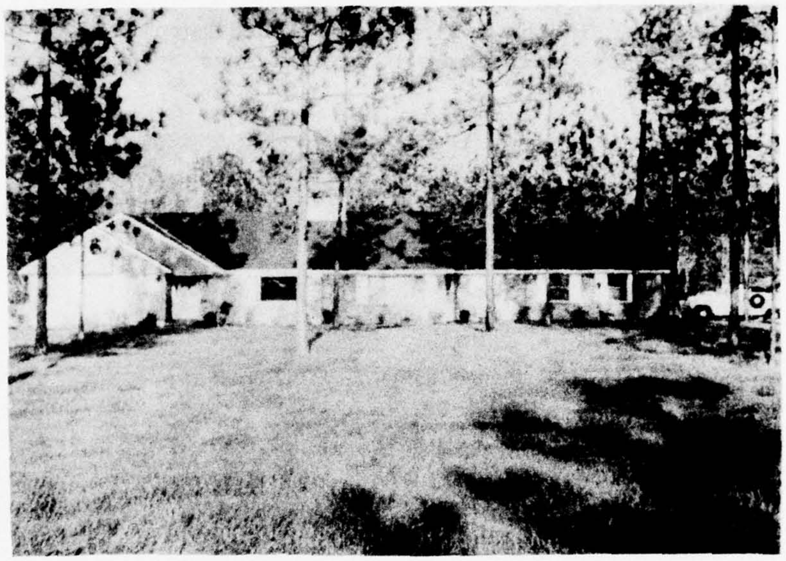
Average annual precipitation varies from about 62 inches per year in the southern portion of the basin to about 54 inches per year at Meridian to the north.

SOCIOECONOMIC TRENDS

The socioeconomic character of the Pascagoula River Basin is changing. Many forces are at work altering the face of the landscape and bringing new social and economic factors into play which will continue to alter the regional significance of the basin and affect outdoor recreation.

It can no longer be said that the basin is essentially an agricultural area. Agricultural land use is still of major significance; however, the processes of urbanization and industrialization are changing the overall economic structure of the area. Neither the urbanite nor the farmer fully realizes how significantly increases in urban population and shifts in the patterns of land use have altered forever the land requirements of town and country. Already people in the cities are beginning to experience what it is to have no "free" land for outdoor recreation pursuits, and many rural

landowners at the urban fringe are feeling the pressures of urban dwellers seeking the pleasures of the out of doors. (See Photograph 1.) This situation has been aggravated too often by a lack of planning for park and recreation space acquisition concurrent with industrial and residential expansion.



1. House Typical of Developments at the Urban Fringe (1965)

Historical Antecedents - In its early developments, the Pascagoula Basin was noted whenever mention was made of the "Cotton South." Areas like the "Jackson Prairie" of the Pascagoula and the "Black Belt" of Alabama and north central Mississippi attracted wealthy planter families from the Carolinas, Georgia, and Virginia during the early years of the 19th century. By 1840, most of the better prairie lands of the basin had been acquired by planters whose holdings often comprised thousands of acres. This general pattern of land use persisted until after the Civil War when it began to decline. The decline in large holdings brought about an increase in the number of tenant farmers.

A number of factors brought about this rapid change. After the war, the "cotton frontier" had moved westward to the "Delta" country of the Mississippi River and to the edge of the high plateaus of west Texas. Soon after the turn of the century, the boll weevil checked much of the enthusiasm for cotton production. By 1915, the tenant farmers felt the impact of the weevil and were on the decline. World War I and the Great Depression reversed the trend. In 1930, the Census of Agriculture

reported over 72 percent of the farmers in the State of Mississippi were tenants. World War II broke the trend, and by 1959, it was reported that farm tenancy had declined to 32 percent.

<u>Agricultural Development</u> - The general downward trend is reflective of the rapid reorganization of land use and the intensified growth of urban and industrial centers. Since the end of World War II, the number of cotton farms in the basin has declined more than 30 percent. On the other hand, cash grain farms have increased by over 40 percent.

2. Cattle Operation on Cash-Grain Land (1965)

This increase in numbers of cash grain farms is in keeping with the emergence of the livestock industry in the area. Today the livestock industry accounts for over 8- percent of the value added to the basin by agriculture. (See Photograph 2.)

Land, once exhausted and gullied by overcropping and erosion, has been planted to pine trees. Forest and idle lands constitute about 80 percent of the area. (See Photograph 3.)

Undeniably, agriculture in the Pascagoula Basin has been transformed from the cotton of earlier days to an integrated cash-grain-livestock-forestry economy.

3. *Managed Pine Forest* (1965)

These shifts in population distribution and associated changes in land-use patterns are of fundamental significance in terms of outdoor recreation. The intensive use of land in the cotton production enterprises provides no particular attraction as an outdoor recreation resource. With the reallocation of cotton holdings into pasture, cash-grain, and managed timberlands, there is created an attractive outdoor recreation resource. Lands given over to pasture and water for cattle provide excellent hunting and fishing possibilities, if managed properly. (See Photograph 4.)

Cash-grain croplands associated with unmanaged woodlands and water constitute outstanding feed and cover resources for small game and upland birds.

Rougher, more rolling lands make attractive camping, picnicking, hiking and riding areas. Outdoor recreation opportunities may be provided on these lands in such a way as to avoid management incompatibilities.

<u>The Urban Scene</u> - Against the backdrop of this quickly changing agricultural enterprise is a diversified and dynamic pattern of urban development. Hattiesburg, the third largest city, is the dominant trade center in the basin. Significant manufacturing employment is provided by firms producing naval stores and wood products, concrete

4. Pasture and Water (1965)

pipe, processed poultry, chemical products, envelopes, processed meat products and clothing.

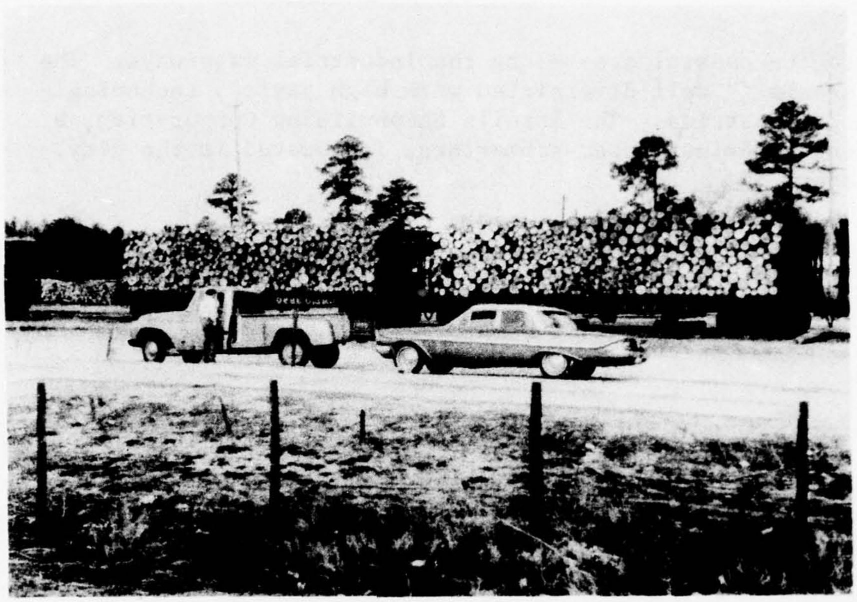
Laurel is the home of Masonite, Inc., the Nation's leading producer of hardboard products. Through its purchase of local pulpwood, this firm provides ancillary employment for hundreds of logging workers and suppliers. (See Photograph 5.)

Large-scale oil and natural gas discoveries have made Laurel the oil exploration center of south-central Mississippi.

Meridian is the State's second largest city and the largest in the Pascagoula Basin. The city is a major railroad center and ranks second as a retail and wholesale center. Manufacturing accounts for important outputs of a variety of items ranging from fabricated aluminum to vitrified clay products.

Biloxi and Gulfport form a strip-city along the Gulf Coast just outside the drainage basin limits. The seafood industry provides seasonal employment for about 5,000 workers. (See Photograph 6.)

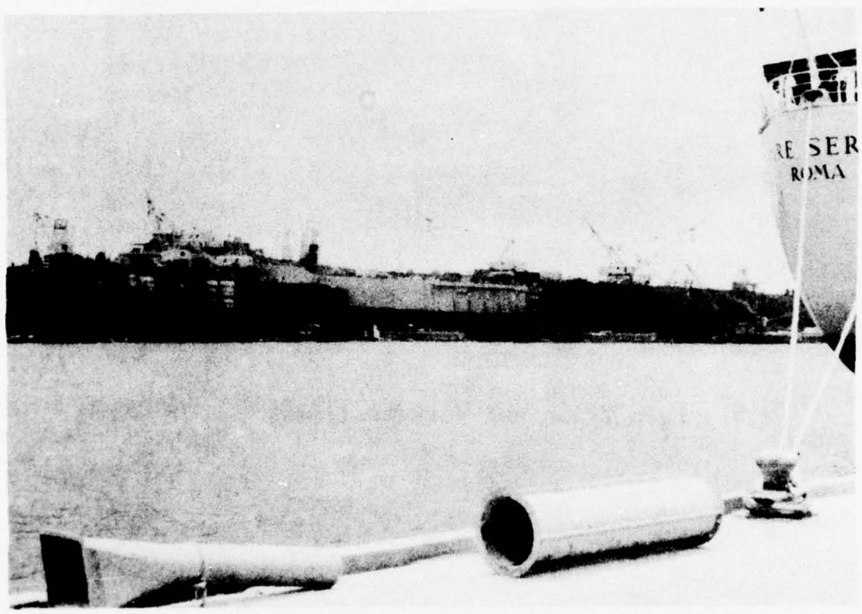
Foreign trade has developed into a major industry as a result of the State's recent expansions in industries, warehousing, and dockage facilities to the Port of Pascagoula. Large industrial plants are



5. Pulp Train and Workers (1965)

6. Commercial Fishing Dock (1965)

gravitating to the coastal area along the industrial waterways. The city of Pascagoula is well diversified with high paying, technologically advanced industries. The Ingalls Shipbuilding Corporation, a major producer of nuclear power submarines, is located in the city. (See Photograph 7.)



7. Shipyards (1965)

The $125 million Standard Oil of Kentucky refinery, with a refining capacity of 100,000 barrels of oil daily, was recently completed in the Bayou Casotte Industrial Area. This area holds substantial promise for the development of a massive petrochemical complex. Paper and menhaden processing plants add further diversification to the city's industrial economy.

Most of the smaller towns in the basin function primarily as service centers to the agricultural and logging interests. The cities of the Pascagoula Basin reflect, in rare fashion, the classic city-hinterland relationship in which urban growth is a direct function of natural resource development and relative location. This city-hinterland relation carries strong implications for outdoor recreation planning. In this region, urban growth reflects an inflow of natural resources from the hinterland to the growth centers. These resources are transformed to goods and services and provide the impetus for further growth and development.

Emerging Issues - Within the urban growth-resource development framework that typifies the basin, there is created a dynamism that is exerting pressures on the land heretofore unexperienced. Urban dwellers are leaving the crowded cities in search of open spaces and recreation resource developments. Landowners at the urban fringe are experiencing new demands for their property and services that were practically unheard of prior to World War II. Economic opportunities, as well as problems of land use and management, are being created rapidly. Such problems cast the framework within which private and public interests must cooperate in meeting public demands.

A significant example of such cooperation lies in the area of maintaining the quality of the recreation environment without impairing economic growth potential. Economic growth in agriculture and industry characterize the Pascagoula Basin. It is the economic growth that is producing more disposable income, leisure time, and mobility.

These factors result in an ever growing demand for outdoor recreation opportunities. Yet, agricultural and industrial practices create pollution problems because of surface runoff carrying sediment, fertilizers and industrial wastes to reservoirs and the coastal waters. Large-scale residential developments further intensify the problem. Polluted streams flowing into the coastal waters coupled with local pollution from urban complexes along the Gulf Coast have so adversely affected water quality that these resources are scarcely fit for recreational use.

This situation exists in an area of intense and growing demand for outdoor recreation opportunities. In the case of some coastal cities, major economic functions such as tourism and recreation services could deteriorate to insignificance because of the quality of the recreational resources. Quality development of the recreational resources is also necessary to achieve a balanced recreational environment capable of meeting the diverse needs of the local residents as well as those of regional and national visitors. Many existing recreational areas have deteriorated to the point of being classed recreation slums.

Other important examples could be cited to demonstrate the same dilemma and to bring sharply into focus the need for mature and mutually compatible solutions. A critical need exists for cooperative public and private planning efforts to meet public social demands.

Corrective measures should also be applied to reverse the trend of environmental deterioration. These corrective measures should focus on improving aesthetic values.

PART III. DEMAND, SUPPLY, AND NEEDS

RECREATION MARKET AREA

For the purpose of this analysis, the recreation market area is defined as the area from which approximately 80 percent of the users are drawn to a project on 1-day outings or weekend (overnight) trips. When the market areas of several basins overlap, it is necessary to distribute or relate the population of the areas of overlap to each of the basins affected. This prevents "double counting."

The problems of "double counting" the population in the Pascagoula River Basin Market Area were experienced early in the development of this report. It was recognized that both the Pearl and the Big Black River Basins are located in the vicinity of the Pascagoula and that all three basins share the same market areas. In a meeting of the Interagency Recreation Work Group, it was decided that the market areas of the three basins would be conterminous with the river basin counties. It is recognized by all agencies concerned that the development programs in the basin will exert influence over much larger areas. However, the limitations of our techniques present serious methodological difficulties in allocating demand regionally. It has been decided that the conservative demand estimates taken from the basin counties are more favorable for project formulation than any gross overestimate resulting from double, and, in some cases, triple counting of the population. In addition to counting the population in the basin counties, the Interagency Work Group gave thorough consideration to those Standard Metropolitan Statistical Areas from which an obvious portion of demand for outdoor recreation facilities would be generated. In each case, a percentage of the urban population was allocated to the basin to be considered in demand calculations. The percentage of the SMSA population was derived mechanically by the procedure described below. The percentages were discussed by all agencies concerned and found to be mutually agreeable.

Chart No. 4 identifies the market area of the Pascagoula River Basin. Notice that the physical boundaries of the drainage basin are overlain by county lines. Standard Metropolitan Statistical Areas influencing the basin are indicated by the arcs of circles representing 125-mile radii. The percentage of the SMSA circle occupied by a portion of the basin was used to determine the proportion of the urban population to include in the demand calculation.

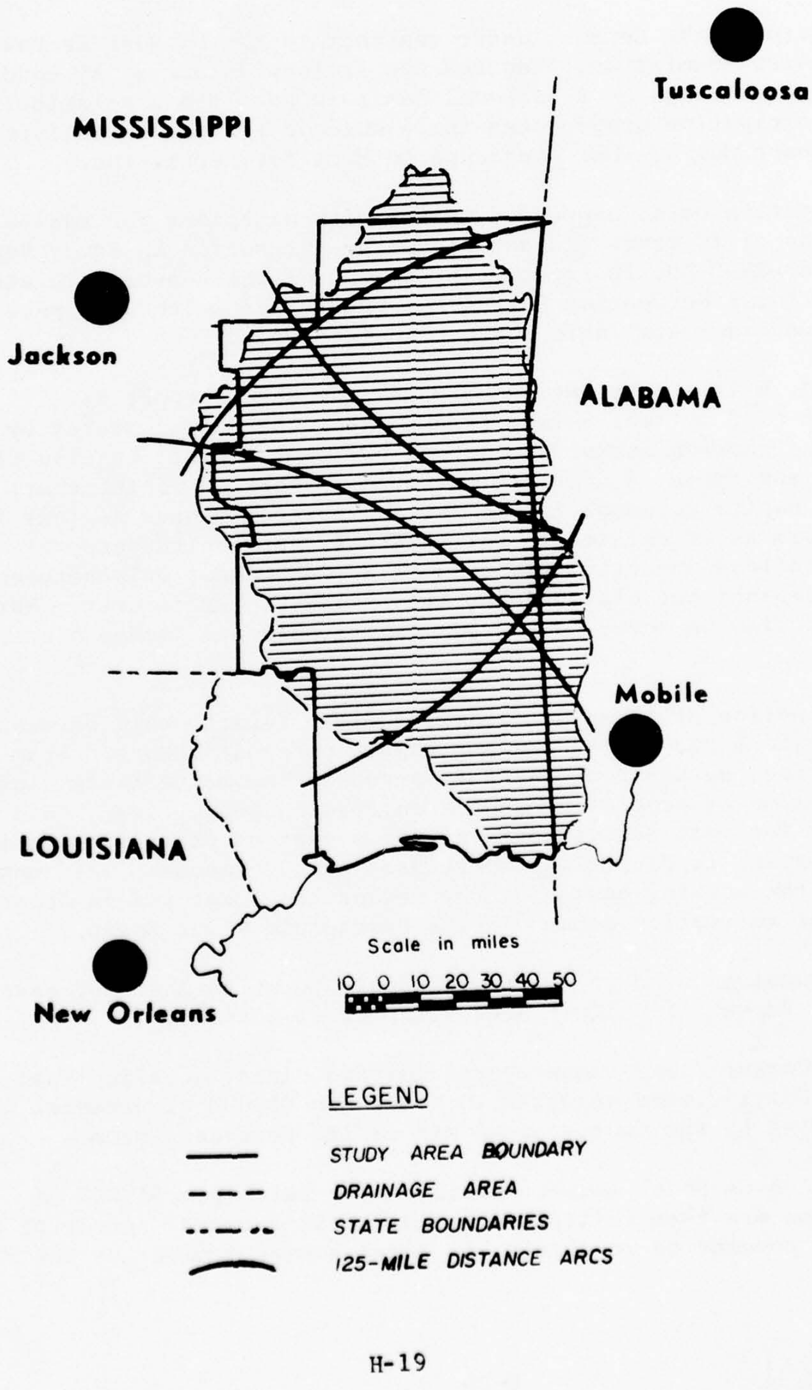
DEMAND

Definition of Terms - Demand for outdoor recreation is defined as the types and quantity of outdoor recreational activities that people desire. True demand is assumed to be that which people will accept

CHART 4

PASCAGOULA RIVER BASIN

RECREATION MARKET AREA



in view of their expressed desires and wants. Demand then is a measure of the people's desires for outdoor recreation; supply is the inventory of existing facilities which are available to satisfy computed demand; and need is the difference between demand and supply and is an expression of unsatisfied demand which is generally converted to facilities.

The Bureau of the Census, under contract to the Outdoor Recreation Resources Review Commission, prepared the Nationwide Survey by conducting home and origin surveys on a national basis to obtain a statistical sampling of participation preferences in 14 outdoor recreation activities. (Reference Chart No. 5, What Americans Do Most for Recreation.)

Participation data, expressed in activity occasions per capita for the population of 12 years old and older, are presented in Study Report No. 19 of the ORRRC publications. The Bureau of the Census completed in 1965 a National Recreation Survey the results of which were published in 1967 but were not available for use in this study.

Chart No. 6 is a compilation of data from ORRRC Report No. 19. The upper portion of Chart No. 6 is a breakdown of the United States by Census Regions showing summer and annual per capita participation rates by residents and types of activity. The lower portion of the chart presents per capita personal income for the several Census Regions in percentage form as it relates to United States per capita personal income. Variations in activity occasions are shown not only between the several regions but also between the United States figures. Variations should also be noted in the per capita personal income portion of the chart.

An examination of these data shows a close relationship between activity occasions per capita and per capita personal income. From this examination, we can conclude that personal income reflects closely the participation by people in outdoor recreation activities. This suggests that for most activities a person's rate of participation in outdoor recreation is directly proportional to his income. This correlation forms the working basis for the methodology employed in determining outdoor recreation demand in the Pascagoula River Basin.

The methodology used in making this adjustment by the Southeast Region of the Bureau of Outdoor Recreation is as follows:

1. The Census South summer participation rates, obtained from ORRRC Report No. 19, were adjusted to rates per $1,000 of personal income by dividing by the Census South per capita personal income.

2. The Census South summer participation rates per $1,000 of personal income are then multiplied by the total personal income of the participating population to obtain the total summer demand for the river basin.

CHART 5

WHAT AMERICANS DO MOST FOR RECREATION

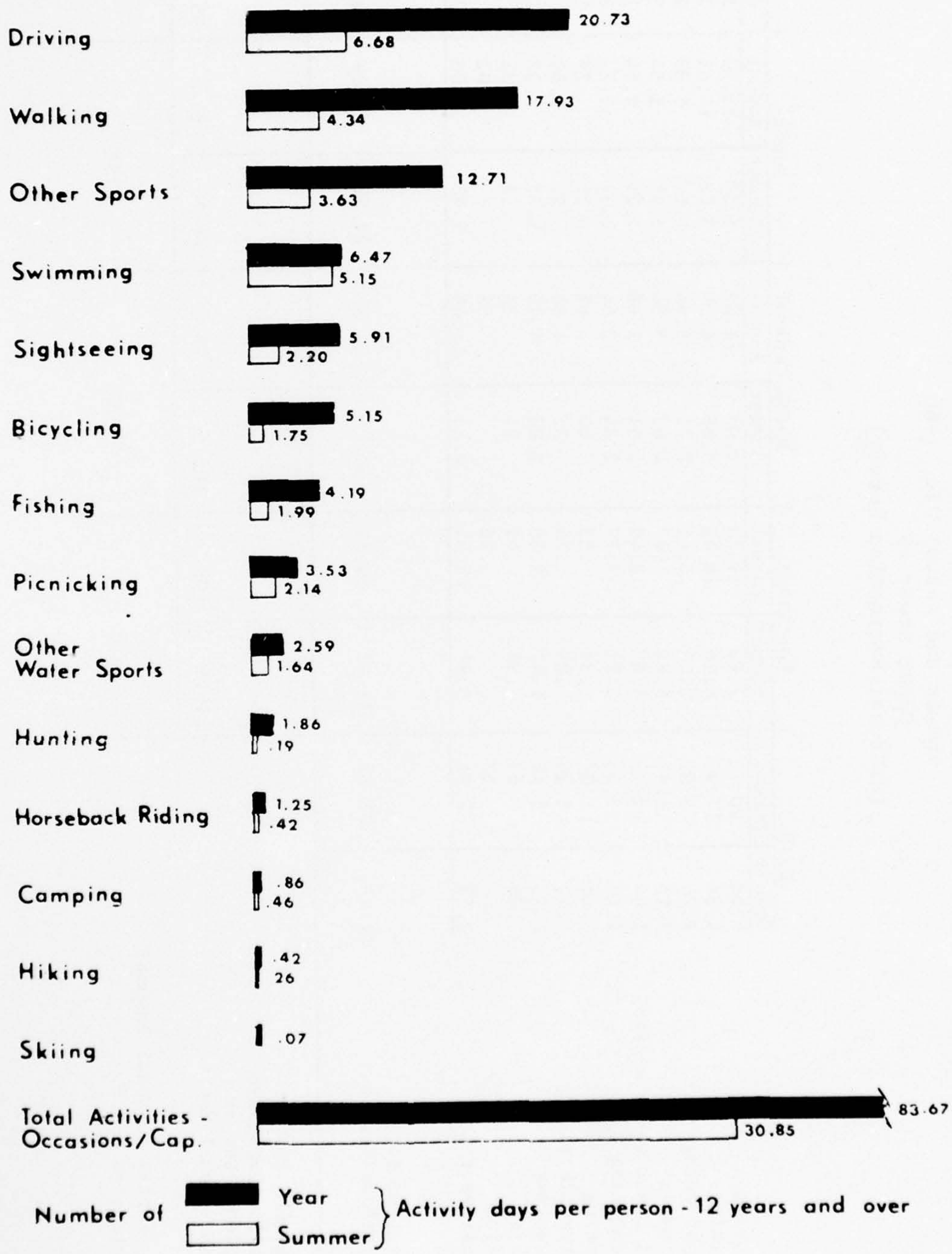


CHART 6

Activity Occasions Per Capita - 12 Years Old and Over
Summer and Annual Use, 1960
ORRRC Study 19
(National Recreation Survey)

	U. S.		Northeast		North Central		South		West	
	Summer	Annual	Summer	Annual	Summer	Annual	Summer	Annual	Summer	Annual
Driving	6.68	20.73	7.23	21.29	8.02	21.32	5.52	19.63	5.21	20.42
Walking	4.34	17.93	6.46	24.62	3.66	16.08	3.18	14.65	3.88	16.67
Sightseeing	2.20	5.91	2.00	5.11	2.71	6.64	1.60	5.09	2.79	7.46
Swimming	5.15	6.47	6.82	7.97	4.63	5.34	3.97	5.54	5.36	7.63
All other water sports	1.64	2.59	1.82	2.49	1.81	2.68	1.29	2.54	1.66	2.65
Picnicking	2.14	3.53	2.81	3.77	2.34	3.64	1.31	2.77	2.09	4.30
Camping	.46	.86	.33	.55	.40	.65	.38	.79	1.05	2.00
Horseback riding	.42	1.25	.29	.74	.32	1.08	.43	1.50	.88	1.96
Bicycling	1.75	5.15	1.47	5.38	2.00	4.98	1.72	5.32	1.84	4.64
Hiking	.26	.42	.28	.41	.21	.35	.17	.35	.49	.72
Skiing		.07		.18		.07		.02		.04
Other sports	3.63	12.71	3.91	12.31	4.15	11.68	2.95	12.88	3.37	14.44
Total Activity Occasions/Capita	28.67	77.62	33.42	84.82	30.25	74.51	22.52	71.08	28.62	82.93
Regional Use as % U.S.-Summer Use Regional Use as %U.S.-Annual Use			116.6	109.3	105.5	96.0	78.5	91.6	99.8	106.8
Per Capita Personal Income: Regions as % U.S.			115%		103%		79%		112%	

3. It was considered that the river basin population and the neighboring SMSA's within the market area of the river basin represented only 80 percent of those who would actually participate in outdoor recreation in the river basin. The demand for outdoor recreation activities obtained by the first four steps was, therefore, increased to give 100 percent demand for outdoor recreation activities in the river basin.

4. The summer demand for outdoor recreation activities other than camping was then converted to the average summer Sunday demand by dividing the summer demand by 13 (the number of weeks in the summer demand period) and taking 40 percent of this demand as being the percentage of the summer week demand occurring on Sunday. In the case of camping, 75 percent of the weekly demand is assumed to occur on the weekend.

5. The summer participation in outdoor activities was adjusted to annual participation on the basis of the percentage of the annual participation that occurred during the summer.

Example:

The amount $1,785 (Census South Per Capita Personal Income, 1960) generates 3.97 summer swimming activity occasions in the South.

Therefore, $1,000 generates 2.224 swimming activity occasions.

If the total personal income of a county in a given year is $500,000,000, the swimming demand in that county will be 500,000 x 2.224 which equals 1,112,000 swimming activity occasions.

The following charts are developed from the application of the method just described and constitute the analysis of demand for this report.

Chart 7 identifies existing and projected population and income growth that will affect the demand for outdoor recreation in the Recreation Market Area. The concept of the Recreation Market Area has been described in the early part of the chapter. The following tabulation identifies the SMSA's and the percentages of their populations that were allocated to the Pascagoula River Basin by the Interagency Work Group for this basin study.

SMSA's	Percent of Population Allocated to Basin Market Area
Jackson, Mississippi	20
Mobile, Alabama	40
New Orleans, Louisiana	15
Tuscaloosa, Alabama	2.5

CHART 7

Pascagoula River Basin
Existing and Projected Population and Per Capita Personal Income

SMSA'S	1965			1980			2015		
	Population	Per Capita Income $	Population x Income (Thousands)	Population	Per Capita Income $	Population x Income (Thousands)	Population	Per Capita Income $	Population x Income (Thousands)
Jackson	50,180	2,050	102,869	75,900	2,792	211,913	177,620	5,016	890,942
Mobile	164,160	2,188	359,182	231,280	2,830	654,522	461,560	4,892	2,257,952
New Orleans	151,590	2,184	331,073	201,120	2,750	553,080	337,455	4,529	1,528,333
Tuscaloosa	2,935	1,761	5,169	3,840	2,193	8,421	6,527	3,873	25,279
Basin	536,700	1,582	849,059	674,100	2,231	1,503,917	1,290,200	4,164	5,372,393
Total Income 80%	-	-	1,647,352	-	-	2,931,853	-	-	10,074,899
Total Income 100%	-	-	2,059,190	-	-	3,664,816	-	-	12,593,624

Chart 7 provides the basic population and income information from which actual demand values are determined for the variety of outdoor recreation activities in the basin. The population and income data are multiplied by a constant representing the activity generating capacity of $1,000 personal income. The product of the multiplication is expressed in activity occasions for the projection years. Chart 8 provides a summary of demand in three different entries of activity occasions; e.g., Total Summer Activity Occasions, Average Summer Sunday Demand, and Total Annual Demand.

SUPPLY

The supply of existing recreation resources and facilities in the study area was determined using the following data. The public supply was obtained from Nationwide Inventory Forms (8-73 Forms) compiled by the Bureau of Outdoor Recreation. Private supply data were taken from the inventory compiled by the National Association of Conservation Districts (NACD) for Mississippi. Presently programmed additions to public recreation facilities were considered and added to the 1965 supply to obtain the 1970 supply. No method was available to project the expansion of private recreation facilities.

Chart 9 lists the known supply of the inland waters and lands of the basin. Chart 10 points out graphically the locations of the areas presented in Chart 9. Chart 11, illustrating the percentages of public recreation land, water, and marsh in the river basin, shows clearly the shortage of developed water resources for outdoor recreation purposes in the basin.

The proportions of land, water, and marsh are shown in Chart 12, while Chart 13 illustrates the location of public outdoor recreation areas of over 20,000 acres. It should be noted that none of these large recreation areas are water areas. All are Class III (natural environment areas) suitable mostly for hunting and some sightseeing. Chart 14 illustrates the percentages of Class III acreages in relation to the more intensively used Classes I, II and IV areas. Chart 12 also bears out the fact that the public recreation resources are predominantly large land areas.

Chart 15 shows the comparison between the amounts of developed outdoor recreation areas and the percent of annual attendance. Chart 16, which compares the percentages for population and attendance by subarea, tends to focus once more on this situation.

Chart 17 of this report summarizes the existing public outdoor recreational facilities in the basin by subarea. Chart 18 converts the public recreation facilities of Chart 17 capacities in terms of people for these facilities. This chart also includes the programmed supply capacity

CHART 8

Pascagoula River Basin
Existing and Projected Summer, Average Summer
Sunday and Total Annual Demand Expressed in
Activity Occasions

Activities and Activity Groups	Activities Per $1,000 Personal Income	1965 Total Summer Activity Occasions (thousands)	1965 Average Summer Sunday Demand in A.O.	1965 Total Annual Demand in A.O. (thousands)	1980 Total Summer Activity Occasions (thousands)	1980 Average Summer Sunday Demand in A.O.	1980 Total Annual Demand in A.O. (thousands)	2015 Total Summer Activity Occasions (thousands)	2015 Average Summer Sunday Demand in A.O.	2015 Total Annual Demand in A.O. (thousands)
Swimming	2.224	4,579.6	140,868.5	6,360.6	8,150.6	250,712.5	11,320.3	28,008.2	861,532.2	38,900.3
Boating	0.689	1,419.0	43,648.4	2,838.0	2,525.0	76,669.0	5,050.0	8,677.0	266,904.5	17,354.0
Canoeing	0.034	70.0	2,153.2	116.7	124.6	3,832.7	207.7	428.2	13,171.4	713.7
Subtotal Water Dependent	2.947	6,068.6	186,670.1	9,315.3	10,800.2	331,214.2	16,578.0	37,113.4	1,141,608.1	56,968.0
Camping	0.213	439.0	23,635.8	914.6	781.0	42,049.0	1,627.1	2,682.0	144,398.9	5,587.5
Picnicking	0.734	1,511.0	46,478.4	3,214.9	2,690.0	82,744.4	5,723.4	9,244.0	284,345.4	19,668.1
Subtotal Water Enhanced	0.947	1,950.0	70,114.2	4,129.5	3,471.0	124,793.4	7,350.5	11,926.0	428,744.3	25,255.6
All other Activities	8.723	17,962.3	552,520.3	59,874.3	31,968.2	983,341.8	106,560.7	109,854.2	3,379,115.2	366,180.7
TOTALS	12.617	25,980.9	809,304.6	73,319.1	46,239.4	1,439,349.4	130,489.2	158,893.6	4,949,467.6	448,404.3

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Pascagoula River Basin
Acreages and Attendances for Public Recreation Areas

Facility Name	Adminis-trative Agency	County	Land Acres	Water Acres	Marsh Acres	Total Acres	Recreational Land Use Classes[1] Classes I & II	Class III	Class IV	Class V	Class VI	Acres Devel-oped Recre-ation Areas	Reported Day Visits 1963	Reported Overnight Visits 1963
Bienville National Forest	USFS	Newton	3,128	-	-	3,128	-	3,128	-	-	-	-	1,000	0
Meridian National Fish Hatchery	BSF&W	Lauderdale	61	24	21	106	-	106	-	-	-	-	2,100	0
U.S. Naval Auxiliary Air Station	U.S.Navy	Lauderdale	4,000		2,000	6,000	-	6,000	-	-	-	76	10,000	1,000
Tom Bailey Lake	MG&F	Lauderdale	100	234	-	334	246	88	-	-	-	12	10,000	100
Clarkco State Park	MPS	Clark	754	64	-	818	164	654	-	-	-	100	54,000	2,100
Bucatunna Creek Wildlife Management Area	MG&F	Clark	64,900[2]	100	-	65,000	-	65,000	-	-	-	-	1,600	0
Meridian Subarea Subtotal			72,943	422	2,021	75,386	410	74,976	-	-	-	188	78,700	3,200
Shongelo Recreation Area	USFS	Smith	37	3	-	40	40		-	-	-	15	58,000	700
Tishkill Lake Recreation Area	USFS	Smith	420	-	-	420	-	420	-	-	-	0	0	0
Marathon Recreation Area	USFS	Smith	400	70	-	470	100	370	-	-	-	29	24,200	800
USFS Lands-Smith County	USFS	Smith	67,371	-	-	67,371	-	67,371	-	-	-	-	20,600	0
Ross R. Barnett Lake	MG&F	Smith	48	87	-	135	135	-	-	-	-	7	5,000	0
USFS Lands-Jasper County	USFS	Jasper	17,140	-	-	17,140	-	17,140	-	-	-	-	5,000	0
Claude Bennett	MG&F	Jasper	119	71	-	190	80	110	-	-	-	6	7,500	75
Tallahala Creek Management Area	MG&F	Jasper	28,850[2]	50	300	29,200	-	29,200	-	-	-	-	20,000	500
Mike Conner Lake	MG&F	Covington	31	88	-	119	119	-	-	-	-	13	7,000	100
Bogue Homa Lake	MG&F	Jones	580	1,200	-	1,780	1,230	550	-	-	-	30	12,000	100
Chickasaway Wildlife Management Area	MG&F	Jones	92,720[2]	-	-	92,720	-	92,720	-	-	-	-	15,000	150
Point Laurel Recreation Area	USFS	Jones	43	-	-	43	43	-	-	-	-	2	2,000	0
Widow Landrum Recreation Area	USFS	Jones	70	-	-	70	-	70	-	-	-	-	0	0
Game Pond Recreation Area	USFS	Jones	110	-	-	110	-	110	-	-	-	-	0	0
Gavin Road Recreation Area	USFS	Jones	36	-	-	36	-	-	36	-	-	-	0	0
USFS Lands-Jones County	USFS	Jones	32,071	-	-	32,071	-	32,071	-	-	-	-	8,700	0
Thompson Creek Recreation Area	USFS	Wayne	80	-	-	80	10	70	-	-	-	6	7,500	300
Piney Woods Recreation Area	USFS	Wayne	80	-	-	80	10	70		-	-	3	200	0
USFS Lands-Wayne County	USFS	Wayne	89,682		-	89,682	-	89,682	-	-	-	-	26,100	1,000
Lakeland Park	MG&F	Wayne	12	-	12	24	24	-	-	-	-	-	-unknown-	0
Laurel Subarea Subtotal			329,900	1,569	312	331,781	1,791	329,954	36	-	-	111	218,800	3,725

1. Class I--High-Density Recreation Areas, Class II--General Outdoor Recreation Areas, Class III--Natural Environment Areas, Class IV--Unique Natural Areas, Class V--Primitive Areas, Class VI--Historic and Cultural Sites.

2. Acreage figures for wildlife management areas embracing USFS lands have been adjusted by the amount of USFS land in order to avoid duplication of acreages. *Actual acreages of these wildlife management areas are:*

Red Creek Wildlife Management Area	350,000
Chickasaway Wildlife Management Area	120,000
Bucatunna Creek Wildlife Management Area	65,000
Leaf River Wildlife Management Area	42,000
Tallahala Creek Wildlife Management Area	42,000

CHART 9 - Continued

Pascagoula River Basin
Acreages and Attendances for Public Recreation Areas

Facility Name	Adminis-trative Agency	County	Land Acres	Water Acres	Marsh Acres	Total Acres	Recreational Land Use Classes[1] Classes I & II	Class III	Class IV	Class V	Class VI	Acres Devel-oped Recre-ation Areas	Reported Day Visits 1963	Reported Overnight Visits 1963
Ashe Lake Recreation Area	USFS	Forrest	29	11	-	40	40	-	-	-	-	19	8,800	1,700
Red Creek Recreation Area	USFS	Forrest	11	-	-	11	11	-	-	-	-	4	8,400	700
Tiak BSA Org. Camp	USFS	Forrest	49	-	-	49	49	-	-	-	-	49	0	3,000
Black & Beaver Dam Creek Float Trip	USFS	Forrest	600	-	-	600	-	-	600	-	-	1	0	0
USFS Lands-Forrest County	USFS	Forrest	49,959	-	-	49,959	-	49,959	-	-	-	-	14,500	0
Paul B. Johnson State Park	MPS	Forrest	810	320	-	1,130	520	610	-	-	-	195	105,000	3,400
Kamper Park	City	Forrest	36	4	-	40	28	12	-	-	-	24	98,000	-
Pineview Park	City	Forrest	40	-	-	40	40	-	-	-	-	30	20,000	-
Miles Branch Recreation Area	USFS	Perry	15	-	-	15	15	-	-	-	-	1	300	100
New Augusta Recreation Area	USFS	Perry	15	-	-	15	15	-	-	-	-	1	300	100
Moody's Landing Recreation Area	USFS	Perry	20	-	-	20	20	-	-	-	-	2	1,400	300
Beaumont Recreation Area	USFS	Perry	80	-	-	80	-	80	-	-	-	-	0	0
Janice Recreation Area	USFS	Perry	20	-	-	20	20	-	-	-	-	4	4,000	600
Sweatwater Lake Recreation Area	USFS	Perry	500	-	-	500	-	500	-	-	-	-	0	0
Camp Attawah Recreation Area	USFS	Perry	47	-	-	47	47	-	-	-	-	47	0	2,500
Leaf River USFS Lands	USFS	Perry	107,613	-	-	107,613	-	107,613	-	-	-	-	31,900	1,000
Black Creek USFS Lands	USFS	Perry	51,865	-	-	51,865	-	51,865	-	-	-	-	14,600	1,000
Leaf River Wildlife Management Area	MG&F	Perry	3,520[2]	-	-	3,520[2]	-	3,520[1]	-	-	-	-	13,000	0
Perry Lake	MG&F	Perry	50	125	-	175	175	-	-	-	-	6	2,000	0
USFS Lands-Green County	USFS	Greene	33,443	-	-	33,443	-	33,443	-	-	-	-	10,200	0
Kurtz State Forest	MFC	Greene	1,740	20	-	1,760	-	1,760	-	-	-	-	200	0
Airey Lake Recreation Area	USFS	Stone	44	6	-	50	15	35	-	-	-	7	2,000	900
USFS Lands-Stone County	USFS	Stone	39,675	-	-	39,675	-	39,675	-	-	-	1	11,600	0
Red Creek Wildlife Management Areas	MG&F	Stone	306,895[2]	2,000	5,000	313,895[1]	-	313,895[2]	-	-	-	-	100,000	10,000
USFS Lands-George County	USFS	George	8,819	-	-	8,819	-	8,819	-	-	-	-	2,900	0
Hattiesburg Subarea Subtotal			605,895	2,486	5,000	613,381	995	611,786	600	-	-	391	449,100	25,300
McHenry Recreation Area	USFS	Harrison	89	-	-	89	-	89	-	-	-	-	0	0
Mill Creek Recreation Area	USFS	Harrison	251	-	-	251	-	251	-	-	-	-	0	0
Big Biloxi Recreation Area	USFS	Harrison	40	-	-	40	40	-	-	-	-	22	15,200	4,000
Tuxachanie Recreation Area	USFS	Harrison	2	-	-	2	2	-	-	-	-	2	2,000	900
Tuxachanie Trail	USFS	Harrison	456	-	-	456	-	456	-	-	-	1	0	0
USFS Lands-Harrison County	USFS	Harrison	60,704	-	-	60,704	-	60,704	-	-	-	-	17,400	0
Magnolia State Park	MPS	Jackson	200	-	-	200	200	-	-	-	-	39	26,000	1,400
USFS Lands-Jackson County	USFS	Jackson	19,205	-	-	19,205	-	19,205	-	-	-	-	5,800	0
Coastal Flatwoods Subarea Subtotal			80,947	-	-	80,947	242	80,705	-	-	-	64	66,400	6,300
Grand Total			1,089,685	4,477	7,333	1,101,495	3,438	1,097,421	636	-	-	754	813,000	38,525

See footnotes 1 & 2 on page H-27.

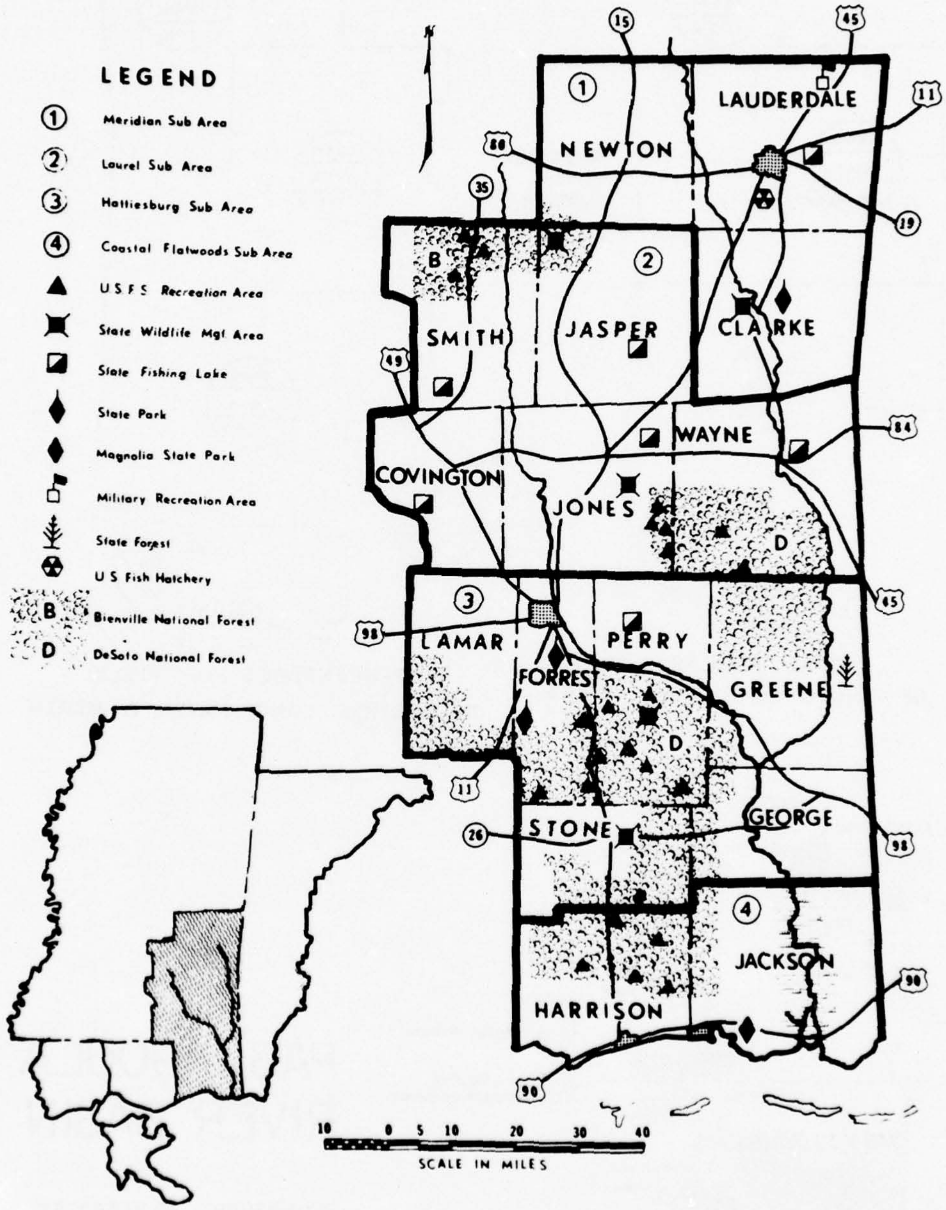


CHART 10

Pascagoula River Basin
Public Recreation Resources

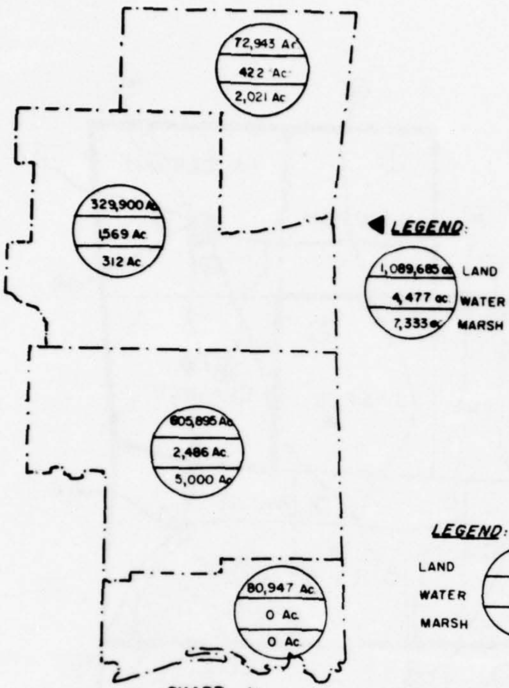


CHART 11

TOTAL ACREAGES
OF PUBLIC RECREATION AREAS

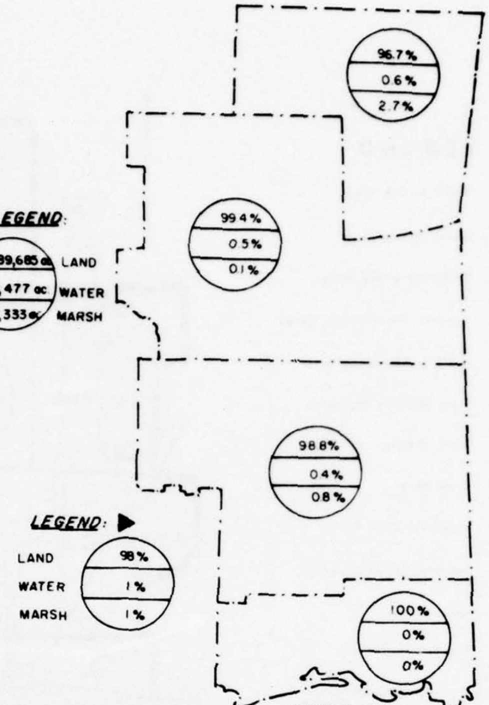


CHART 12

PERCENTAGES OF PUBLIC
RECREATION LAND, WATER & MARSH

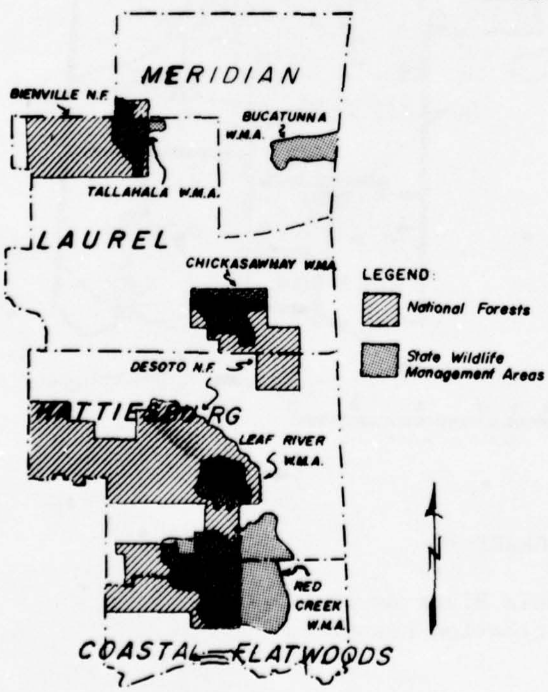


CHART 13

LARGE PUBLIC RECREATION
AREAS (OVER 20,000 ACRES)

PASCAGOULA RIVER BASIN

SHOWING SUBAREAS

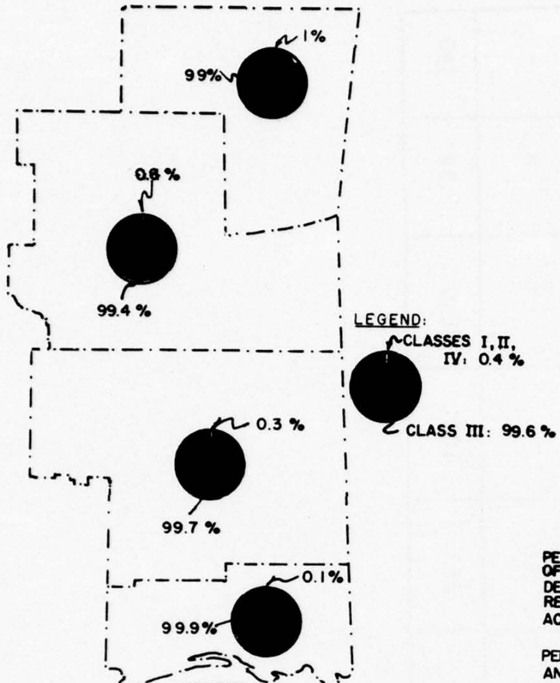


CHART 14

LAND CLASSES BY PERCENTAGES

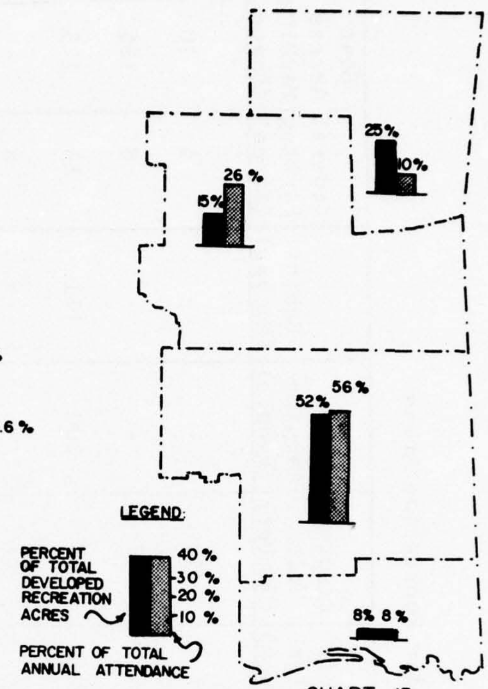


CHART 15

COMPARISON OF PERCENTAGES OF DEVELOPED RECREATION ACRES AND ANNUAL ATTENDANCE

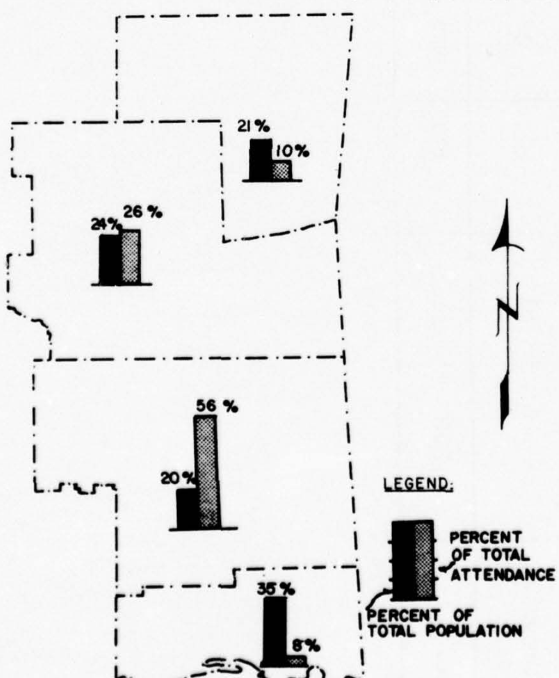


CHART 16

COMPARISON OF PERCENTAGES FOR POPULATION & ATTENDANCE BY SUBAREAS

PASCAGOULA RIVER BASIN

SHOWING SUBAREAS

CHART 17

Pascagoula River Basin
Existing Recreation Facilities at Known Public Recreation Areas

Subarea	Acres of Water With Access	Acres of Beach	Swimming Pools (Sq.Ft.)	Picnic Areas (Acres)	Picnic Tables (Number)	Camping Units (Number)	Group Camping (People)	Cabins (Number)	General Parking (Acres)	Boat Access Parking (Spaces)
Meridian	298	7	-	21	57	50	-	-	6	70
Laurel	1,533	10	-	48	94	47	-	-	8	185
Hattiesburg	2,469	7.5	6,900	116	120	101	100	111	13	275
Coastal Flatwoods	-	10	-	22	27	55	-	9	5	-
GRAND TOTAL	4,300	34.5	6,900	207	298	253	100	120	32	530

CHART 18

Pascagoula River Basin
Existing and Projected Daily Capacities of Known Public and Private Recreation Areas
in Activity Occasions

Subareas	Swimming Capacity	Boating Capacity	Camping Capacity	Picnicking Capacity	General Parking Capacity	Boat Access Parking Capacity
MERIDIAN SUBAREA						
1965 Public Sector	4,200	149	250	570	2,400	210
1965 Private Sector	1,175	192	2,648	530	-	-
1965 Public & Private	5,375	341	2,898	1,100	2,400	210
Programmed (Public)[1]	-	-	190	520	-	60
1970 Public & Private	5,375	341	3,088	1,620	2,400	270
LAUREL SUBAREA						
1965 Public Sector	6,629	767	235	940	3,200	555
1965 Private Sector	150	204	-	350	-	-
1965 Public & Private	6,779	971	235	1,290	3,200	555
Programmed (Public)	1,200	-	600	330	800	-
1970 Public & Private	7.979	971	835	1,620	4,000	555
HATTIESBURG SUBAREA						
1965 Public Sector	4,500	1,235	1,360	1,200	5,200	675
1965 Private Sector	190	561	1,904	430	-	-
1965 Public & Private	4,690	1,796	3,264	1,630	5,200	675
Programmed (Public)	2,400	-	490	1,430	-	132
1970 Public & Private	7,090	1,796	3,754	3,060	5,200	807
COASTAL FLATWOODS SUBAREA						
1965 Public Sector	6,000	-	135	270	2,000	-
1965 Private Sector	880	99	493	450	-	-
1965 Public & Private	6,880	99	628	720	2,000	-
Programmed (Public)	7,200	-	1,050	650	4,800	234
1970 Public & Private	14,080	99	1,678	1,370	6,800	234
TOTAL RIVER BASIN						
1965 Public Sector	21,329	2,151	1,980	2,980	12,800	1,440
1965 Private Sector	2,395	1,056	5,045	1,760	-	-
1965 Public & Private	23,724	3,207	7,025	4,740	12,800	1,440
Programmed (Public)	10,800	-	2,330	2,930	5,600	426
1970 Public & Private	34,524	3,207	9,355	7,670	18,400	1,866

1. Okatibee Reservoir presently under construction by the Corps of Engineers has been considered as part of the basin plan in Charts 22 and 24.

as taken from the BOR 8-73 Inventory Forms and includes, as well, the existing private sector as supplied by the National Association of Conservation Districts (NACD).

The conversion factors, used in converting the facilities given in Chart 17 to capacities in Chart 18, were given in Part I of this report under PLANNING CRITERIA.

The Coastal Flatwoods Subarea is similar to the other three subareas in that it also lacks developed fresh-water recreational sites. The Coastal Flatwoods Subarea does have at its doorstep, however, the vast resource of the Mississippi Sound. The outdoor recreational opportunities made possible by this resource include beachcombing, powerboating, sailing, and salt-water fishing. This coastal strip of land as it is further developed will continue to attract visitors from the Gulf Coast Region as well as from the more populous Eastern and Midwestern States. The demand for this salt water outdoor recreation resource will undoubtedly be high in the future as incomes throughout the region rise. It can also be assumed that most of the future development of this resource will be undertaken by private enterprise. In general, the coastal strip is an urbanizing area growing much faster than the rest of the basin. Very little information about the private sector's supply of recreation facilities is available for this area. Boating and swimming capacities can only be estimated.

The most valuable outdoor recreation resource in the Coastal Flatwoods Subarea is the strip of beach along the coast in Harrison County. This beach was artificially created by the Corps of Engineers in 1953 and stretches for some 24 miles. If public rights to portions of the beach are not secured and the land actively administered by some public agency, it may become lost to free public use. Some reports already describe this coastal strip as a tourist mecca, and estimates of annual attendance run as high as five million people.

The other three subareas of the basin; Hattiesburg, Laurel, and Meridian are inland and at present have poorly developed outdoor recreation facilities, particularly water-related. However, National Forest lands in the Hattiesburg and Laurel Subareas, as well as State lands, offer substantial resources of undeveloped outdoor recreation land to the public.

The Hattiesburg Subarea attracts the largest percentage of the attendance. This is undoubtedly because it has the largest percentage of public outdoor recreation land in the basin, some 55 percent of the basin total. It would appear at first glance that the bulk of the Coastal Flatwoods Subarea population was recreating in the Hattiesburg Subarea. This may be only partly true. Observers in Mississippi have reported that the residents of the Coastal Flatwoods Subarea tend to make greater use of the gulf coastal strip than our studies indicate. These observers claim that the high attendance figures for the Hattiesburg Subarea are

the result of people recreating there from outside the basin, largely from New Orleans and Mobile, but also from considerable distances away. It is assumed that the developed outdoor recreation areas of the Hattiesburg Subarea draw tourists from the Coastal Flatwoods Subarea for what might be considered by them secondary recreation activities, their principal activities being confined to the coast.

The comparison of annual attendance and acres of developed recreation land in the Laurel and Meridian Subareas seems to present a paradoxical situation. The Laurel Subarea has 15 percent of the basin's outdoor recreation land but receives 26 percent of the annual attendance while the Meridian Subarea has 25 percent of the basin's outdoor recreation land and receives only 10 percent of the annual attendance. However, if Chart 9, which lists by subarea the outdoor recreation facilities of the basin, is examined, it can be seen that the Laurel Subarea has a great deal more Classes I and II type areas than does the Meridian Subarea. Moreover, the Laurel Subarea has a slightly larger population.

NEEDS

Existing needs may be defined as the demand for outdoor recreation opportunities less the present capacity of existing resources and facilities. In short, needs are unsatisfied demand expressed in terms of facilities. Projected needs are based upon projected demand less projected supply.

Chart 19 of this report shows the present and projected imbalance between demand and supply in terms of need. Supply figures have been given only up until 1970 when the present programmed facilities (as abstracted from 8-73 Forms) will be in operation.

The demand figures that have been used in Chart 19 are average summer Sunday demand figures. This is the day when the greatest demand (outside of peak holiday use; i.e., Fourth of July and Labor Day) is put upon a river basin's supply facilities and is, therefore, the day which must be considered if the entire demand for the river basin's outdoor recreation opportunities is to be logically satisfied. The need, determined for the average summer Sunday, is first given in capacity and is then reduced to needed facilities (Chart 19). The method used in making this conversion is the same as that used in making the conversions from facilities to capacity in Chart 18.

For all activities, except canoeing, there is a shortage of supply facilities. Projected needs, however, do not take into account substitute activities. Projected needs, based not only on demographic trends but on income as well, may not necessarily be consonant with present needs based upon existing demand. In the Pascagoula River Basin, it is quite possible that as incomes rise the demand for salt water facilities may correspondingly increase. Some of the need within the

CHART 19

Pascagoula River Basin
Existing and Projected Average Summer Sunday Unsatisfied Demand
and Needs (Expressed in Terms of Facilities)

Item	Swimming	Boating	Canoeing	Camping	Picnicking
1965 Average Summer Sunday Demand	140,868	43,648	2,153	23,636	46,478
1965 Average Summer Sunday Supply	23,724	3,207	43,860	7,025	4,740
1965 Unsatisfied Demand	117,144	40,441	-	16,611	41,738
Need Expressed in Facilities	195 Acres of Beach	80,882 Acres of Water	-	3,322 Camping Units	4,174 Picnic Tables
1980 Average Summer Sunday Demand	250,712	76,669	3,833	42,049	82,744
1970 Average Summer Sunday Supply	34,524	3,207	43,860	9,355	7,670
1980 Unsatisfied Demand	216,188	73,462	-	37,694	75,074
Need Expressed in Facilities	360 Acres of Beach	146,924 Acres of Water	-	7,539 Camping Units	7,507 Picnic Tables
2015 Average Summer Sunday Demand	861,532	266,904	13,171	144,399	284,345
1970 Average Summer Sunday Supply	34,524	3,207	43,860	9,355	7,670
2015 Total Annual Unsatisfied Demand	827,008	263,697	-	135,044	276,675
Need Expressed in Facilities	1,378 Acres of Beach	527,394 Acres of Water	-	27,009 Camping Units	27,668 Picnic Tables

basin, therefore, may be satisfied in the future without needing to build up the inland fresh-water facilities of the basin to the total as suggested.

To determine annual unsatisfied demand, the daily supply capacity figures (Chart 18) have been adjusted to correspond with the annual demand figures. The method used in making this adjustment is as follows: The daily supply capacities for each activity have been taken from Chart 18 and multiplied by the reciprocal of 40 percent (75 percent for camping) in order to determine the average summer week use that can be expected of the supply facilities. To determine the summer use of supply facilities, the summer week supply has been multiplied by 13. The result of this step is then multiplied by the reciprocal of the percent the summer supply represents of the total annual supply.

Total annual unsatisfied demand, Chart 20, has been calculated by subtracting from the total annual demand (Chart 8) the total annual use of supply facilities.

According to a report prepared by the Bureau of Sport Fisheries and Wildlife, there is now, and there will be in the target years, adequate salt-water fish available to satisfy the demand for sport salt-water fishing. If estuarine habitats are protected against pollution and major changes in river flows, they are capable of supporting increased production.

It is estimated, also by the Bureau of Sport Fisheries and Wildlife, that there will be a need for 248,616 man-days of fresh-water fishing per year by 1980 and a need for 1,327,278 man-days of fresh-water fishing per year by 2015. In 1980, there will be a need for 148,480 man-days of hunting per year and in 2015 a need for 771,248 man-days of hunting per year.

CHART 20

Pascagoula River Basin
Existing and Projected Total Annual
Unsatisfied Demand in Activity Occasions
In Thousands

	Swimming	Boating	Camping	Picnicking
1965 Total Annual Demand	6,360.6	2,838.0	914.6	3,214.9
1965 Total Annual Supply*	1,070.9	104.2	272.2	327.8
1965 Total Annual Unsatisfied Demand	5,289.7	2,733.8	642.4	2,887.1
1980 Total Annual Demand	11,320.3	5,050.0	1,627.1	5,723.4
1970 Total Annual Supply*	1,558.4	104.2	362.5	530.4
1980 Total Annual Unsatisfied Demand	9,761.9	4,945.8	1,264.6	5,193.0
2015 Total Annual Demand	38,900.3	17,354.0	5,587.5	19,668.1
1970 Total Annual Supply*	1,558.4	104.2	362.5	530.4
2015 Total Annual Unsatisfied Demand	37,341.9	17,249.8	5,225.0	19,137.7

*Annual use that can be expected from supply

PART IV. OUTDOOR RECREATION PLAN

APPRAISAL OF RECREATION POTENTIALS

Examination of the foregoing presentations of demand, supply, and needs information reveals a critical shortage of facilities in every class of water-dependent and water-enhanced outdoor recreation activity in the Pascagoula River Basin. Swimming areas, picnicking and camping facilities, and water for boating do not satisfy the present demand, nor will programmed facilities and projects proposed to be completed by 1980.

Only for canoeing is there an adequate supply of water to satisfy the demand for the activity now and in the future. However, when we consider that canoe tripping usually involves camping, it appears essential that more campsites be established along the canoeable streams to provide the public with the facilities they desire.

The Pascagoula, Leaf and Chunky Rivers and Red Creek were among 650 rivers initially screened as possible scenic or wild rivers. Although all of these rivers have scenic and recreational qualities worthy of development, none possessed the outstanding qualities necessary for inclusion in the national wild or scenic rivers program.

The present supply of camping facilities in the basin meets only about one-third of the existing demand. Projections indicate that by 1980, with the additional camping areas that are presently programmed, less than one-fourth of the area's demand will be satisfied.

Picnicking facilities also require immediate enlargement since barely one-tenth of the present demand is being met. Even with programmed facilities, the basin will fail to meet one-tenth of the needs through 1980.

Of probably even greater importance is the shortage of water areas on which to base these picnicking and camping facilities--water areas where one may also enjoy boating, water skiing, and swimming. Public recreation areas presently satisfy less than one-sixth of the swimming demand and will fall further behind in the projected years. Areas suitable for sailing, water skiing, and boating are equally in short supply.

By virtue of the physiographic, hydrologic, and vegetative character of the basin, it appears that the proper environment exists to satisfy hunting demands. It should be recognized that calculations of hunting capacities are based on maximum possible sustained harvest figures and, as such, are theoretical. Tolerance to hunter crowding, posting and zoning against hunting, and public acceptance of liberalized hunting regulations all militate against realization of the full potential.

Although the Bureau of Sport Fisheries and Wildlife indicates ample potential land for hunting, careful husbandry of the better hunting areas is necessary. The analysis of habitat productivity and hunting capacity points up this important consideration for future planning. The mixed bottomland hardwood habitat has, by far, the greatest capacity for supporting hunting. Although it makes up only 10 percent of the area of the basin, it provides the capacity for almost one-fourth of the available hunting in the basin. Future planning should recognize the important role played by bottomland hardwood areas in meeting hunting demand.

Since fishing habits of basin residents are obviously influenced by available coastal fishing waters, any comparison of basin supply must consider salt-water fishing. Such a consideration should weigh the influence of type and location of habitat, availability of existing resources, opportunities for development, and long-range trends in preference. In following through on its study of fishing resources in the Pascagoula Basin, the Bureau of Sport Fisheries and Wildlife concluded without a doubt that salt-water habitat is adequate to support the estimated demand-- now and in the target years.

When the Bureau of Sport Fisheries and Wildlife contrasted salt-water fishing with fresh-water fishing, it was found that the demand for fresh-water fishing exceeded supply. Analysis disclosed that additional habitat is needed not only to satisfy the increased future demand but also the deficit supply in 1966 in order that all man-days of demand will meet established criteria utilized in the determination of supply.

In this appraisal of the recreation potential of the basin it should be emphasized that there is presently an environmental deterioration of the resources of the basin but this trend can be reversed and the natural beauty of the area enhanced.

Federal and State agencies have prepared plans to meet the existing and growing demand for outdoor recreation in the basin. These include developing existing resources and establishing new outdoor recreation areas throughout the basin. The resource in shortest supply in the basin is water for boating and swimming. The major agencies capable of increasing this supply include the Pat Harrison Waterway District, the Corps of Engineers, the Soil Conservation Service, and the U.S. Forest Service. Under cost sharing provisions incorporated in the Federal Water Project Recreation Act, groups such as the Pat Harrison Waterway District, the Mississippi Park System and local counties and municipalities could, by agreeing to cost share, facilitate the recreation development of Corps of Engineers and Soil Conservation Service projects. The Pat Harrison Waterway District has already provided a statement of intent to cost share on the recreation and fish and wildlife cost of proposed major reservoir projects in the basin.

The greatest bulk of new water areas can be supplied through programs proposed by the Corps of Engineers, the Soil Conservation Service, and the Pat Harrison Waterway District. An additional source of supply, difficult to evaluate, yet capable of meeting much of the demand for boating and swimming water, is the Mississippi Sound. To meet this demand, public access must be made available to the waters at the mouth of the Pascagoula River and the Mississippi Sound itself. This could very well be a role of the State, counties, and municipalities.

The American Island Study, presently underway by the Bureau of Outdoor Recreation, has identified seven islands in the Mississippi Sound which appear to have a significant potential for outdoor recreation. These seven islands are Cat, Round, Petit Bois, Ship, Horn, Deer, and Grand Batture. All of these islands with the exception of Round, Deer and Grand Batture have been included in the proposed Gulf Islands National Seashore, which also includes islands offshore from the States of Florida, Alabama, and Louisiana. Development of the recreational resources of these islands would provide additional opportunities for the basin residents.

In addition to the public supply of facilities that can be developed to meet the recreation demand for boating and swimming activities, the private sector is also expected to increase its share of the recreation supply.

The increasing demand for water-enhanced recreation activities, principally camping and picnicking, can be met in part at sites surrounding the future water impoundments in the basin and through expanded facilities in national forests; State parks, and local, county, and city parks. This report includes the programmed additional facilities to the year 1970 of such agencies. The private sector will also take up much of the demand for these activities. However, since these activities do not require water impoundments, much of the demand can be met through providing greater access to the Pascagoula River and its tributaries and providing picnicking and camping sites where such access has been made available. Canoe trip camping could be provided for at such sites, as well as at additional sites kept in a more primitive condition along the river. Civic and county groups, as well as the State of Mississippi and the U. S. Forest Service, should be capable of providing such sites.

No areas exist in the basin that presently meet the criteria for national recreation area designation. There are no significant nationwide trails either. However, the Gulf Coast Trail which has been suggested in the Bureau of Outdoor Recreation report, "Trails for America", could conceivably have segments traversing the basin. The specific routing of this trail has never been charted. Another trail discussed in the above report, the DeSoto Trail, comes close to the basin but does not enter it.

ESTABLISHMENT OF GOALS

The goal of this recreation plan is to satisfy the recreational desires of the population within the recreation market area of the Pascagoula River Basin. This should be accomplished efficiently to the extent practical as revealed by the appraisal of the area's recreation resource potential and keeping in mind the parallel need for enhancement of the basin's natural beauty.

Two points in time are focused upon in ascertaining the demand for recreation. These points are the years 1980 and 2015. Chart 19 may be referred to in order to obtain an insight into the demand for swimming, boating, camping, canoeing and other activities predicted for those years.

ALTERNATIVES

Consideration was given to the possible development of other river basins as a means of satisfying some of the recreational demand of the Pascagoula River Basin Recreation Market Area. Comprehensive river basin plans are being formulated for the Pearl and Big Black River Basins which drain a large area immediately west of the Pascagoula River Basin. At the present time, the data available on the Pearl and Big Black River Basins do not indicate that a substantial part of the recreational demand of the Pascagoula River Basin could be satisfied more efficiently or effectively in these basins. No comprehensive river basin plans are being developed in other areas which might provide recreational services to the Pascagoula River Basin Recreation Market Area, and information available does not indicate that any other area would be able to supply the needed recreational services more effectively or efficiently.

The Mississippi Sound, however, does have the potential of satisfying some of the demand for recreation from the Pascagoula River Basin Recreation Market Area. An expansion of present recreational use of this area is possible. In a strict sense the recreational activities possible in this area do not substitute for the recreational activities supplied by this plan. Many of the boaters of the market area would prefer boating in a reservoir to boating in the sound. There is a safety hazard associated with boating on the sound that would not be as common on the reservoirs. This is not meant to imply that the boating potential of the sound should not be developed. Even with the full implementation of this plan, there will be a large amount of boating demand that can be met only by continued development of the sound's recreation potential.

A third alternative considered was to move the construction of all planned reservoirs into the early-action program. Projected 1980 demand for recreation justified such a course of action. However, under present policies of cost sharing and project evaluation, such a course would be

difficult; therefore, this alternative in its entirety was rejected. However, it was decided to move all of the reservoirs proposed for construction by the Pat Harrison Waterway District and one of the reservoirs proposed by the Corps of Engineers into the early-action program.

Use of the streams and rivers in the basin was also considered as a possible alternative to reservoir construction. On the smaller streams of the Pascagoula River Basin, boating is not now possible during most of the summer months because of the low mean flows common in these areas. This low summer flow should improve somewhat when the proposed upstream reservoirs are constructed.

Some stream improvement and provision of access every 15 or 20 miles along some of the streams would result in considerably more boating.

Even with full development of the streams by the year 2015, the projected demand for boating would not be met. Therefore, by itself, this alternative cannot be considered a means of meeting the total demand for recreational boating.

The construction of single-purpose recreation reservoirs was considered as an alternative to multiple-purpose reservoir construction. In the case of other water-dependent general outdoor recreation activities, there is a basic shortage of water acreage in the basin which would necessitate the construction of reservoirs to meet the unsatisfied demand for these activities. This could be done through the construction of single-purpose recreation reservoirs. Estimated costs for such reservoirs of the same size and at approximately the same locations as the proposed multiple-purpose reservoirs equaled or exceeded the costs of providing for recreational use at multiple-purpose reservoir sites.

FEATURES OF THE PLAN

In order to provide additional recreational opportunity in the Pascagoula River Basin, additional recreation water in the form of reservoirs must be provided. Therefore, this plan is centered around the development of recreation facilities at the reservoirs proposed for construction in the early-action period.

The plan also points out the need to expand existing recreational facilities throughout the basin including those administered by Federal, State and local bodies.

The development of high quality recreation facilities by the private sector is also necessary, particularly adjacent to urban areas, if the basin's future recreation needs are to be met.

The recreation aspects of the basin as presented in this section consist of a recreation plan for the early-action (1980) period together with consideration of potential projects in the 2015 time period.

Chart 21 lists the reservoirs recommended for construction by 1980 by various construction agencies. This chart also shows the streams upon which the reservoirs will be located, the counties in which they will be located, and the approximate normal pool size of the reservoirs. Acreages of the U.S. Forest Service reservoirs are shown in total for the entire basin.

The average summer Sunday capacity of each proposed early-action reservoir for various recreational activities was determined and is presented in Chart 22. Potential projects have been evaluated in Chart 23. These average summer Sunday capacity figures are considered the design load for each reservoir. From them, an estimate of the annual capacity for each considered activity was determined. The results of this computation are also shown in Chart 22 and Chart 23. From these data, a determination was made of the recreational facilities needed at each reservoir. This information is presented in Charts 24 and 25. Chart 26 depicts the locations of the proposed early-action (1980) reservoir projects and the potential (2015) reservoir projects.

The demand for canoeing is shown in Chart 21. There are 3,655 miles of streams in the Pascagoula River Basin which are presently suitable for canoeing. This is more than adequate to meet the projected canoeing demand for both target years. However, canoe tripping often involves camping and more campsites will be needed along the streams to satisfy the canoeing demand. Because of the lack of benchmark data for this activity, no attempt has been made to predict the number of campsites needed for this purpose.

Overlooks and hiking trails are proposed at some of the early-action reservoirs. These facilities are planned to accommodate such activities as hiking, nature study, sightseeing, etc.

All recreation facility construction should be in harmony with or enhance the general character of the basin landscape. The recommended projects should be designed to preserve, enhance, or protect natural beauty and prevent environmental pollution.

The Bureau believes that the considered potential (2015) projects of the three construction agencies offer definite recreation potential but recognizes that more detailed planning is necessary to further evaluate these projects.

One potential reservoir project (Benndale) conflicts with a possible land acquisition proposal of the U.S. Forest Service to preserve Black Creek as a free-flowing fishing stream. A proposal by the U.S. Forest Service is to acquire lands adjacent to Black Creek for preservation and recreation use.

CHART 21

Pascagoula River Basin
New Water Areas
Proposed Early-Action Program

Project Name	Stream	County	Area of Normal Pool (Acres)
Corps of Engineers			
Taylorsville	Leaf River	Smith	3,500
Okatibbee (under construction)	Okatibbee Creek	Lauderdale	3,200
Tallahala	Tallahala Creek	Jasper	4,400
Bowie	Bowie Creek	Covington	5,500
Mize	Oakohay Creek	Smith	3,600
Harleston	Escatawpa River	George	14,000
Soil Conservation Service			
Chunky-Okahatta	Chunky River	Newton	400
Chunky-Okahatta	Chunky River	Newton	150
Big Creek	Big Creek	Smith	250
Big Creek	Big Creek	Jones	110
Upper Leaf	Upper Leaf River	Smith	250
West Bowie	Bowie River	Jefferson Davis	100
Upper Bowie	Bowie River	Simpson	100
Dry Creek	Bowie River	Covington	150
Sowashee	Sowashee Creek	Lauderdale	100
West Tallahala	Tallahala Creek	Newton	150
Upper Tallahatta	Tallahala Creek	Lauderdale	100
Okatoma Creek	Okatoma Creek	Simpson	250
Okatoma (Blackley)	Okatoma Creek	Covington	300
Okohay	Oakohay Creek	Smith	150
Oakey Woods (Station Creek)	Oakey Woods Creek	Covington	150
Tallahoma	Tallahoma Creek	Jasper	300
Okatibbee (Penders)	Penders Creek	Kemper	250
Bogue Homo	Bogue Homo	Jasper	200
Souinlovey (Penantly)	Penantly Creek	Jasper	250
Bucatunna (East)	Bucatunna Creek	Lauderdale	250
Pat Harrison Waterway District			
Kittrell	Kittrell Creek	Greene	329
Whetstone	Hollis Creek	Wayne	256
West Tiger Creek	West Tiger Creek	Jones	217
Thompson Creek	Thompson Creek	Perry-Wayne	4,100
Flint Creek	Flint Creek	Stone	600
Little Black Creek	Little Black Creek	Lamar	400
Big Creek	Big Creek	George	300
Archusa Creek	Archusa Creek	Clarke	400
U.S. Forest Service*			
Total Acres	Basinwide		1,089

*U.S. Forest Service data is for projects within the Pascagoula River Basin drainage area only.

CHART 22

Pascagoula River Basin
Average Summer Sunday Capacity and Annual Use in Activity Occasions for Proposed Early-Action Projects

Early Action Projects (1980)	Normal Pool Size (Acres)	Boating: Average Summer Sunday Activity Occasions	Boating: Annual Activity Occasions	Swimming: Average Summer Sunday Activity Occasions	Swimming: Annual Activity Occasions	Camping: Average Summer Sunday Activity Occasions	Camping: Annual Activity Occasions	Picnicking: Average Summer Sunday Activity Occasions	Picnicking: Annual Activity Occasions	Other Activities: Average Summer Sunday Activity Occasions	Other Activities: Annual Activity Occasions	Estimated Annual Recreation Activity Occasions
Corps of Engineers												
Taylorsville	3,500	1,750	113,750	10,780	486,609	1,015	36,652	3,535	244,445	7,175	804,102	1,685,558
Okatibbee	3,200	1,600	104,000	9,856	444,900	928	33,510	3,232	223,493	6,560	735,179	1,541,082
Tallahala	4,400	2,200	143,000	13,552	611,737	1,276	46,076	4,444	307,303	9,020	1,010,871	2,118,987
Bowie	5,500	2,750	178,750	16,940	764,672	1,595	57,595	5,555	384,128	11,275	1,263,589	2,648,734
Mize	3,600	1,800	117,000	11,088	500,512	1,044	37,699	3,636	251,429	7,380	827,077	1,733,717
Harleston	14,000	7,000	455,000	43,120	1,946,437	4,060	146,607	14,140	977,781	28,700	3,216,409	6,742,234
Soil Conservation Service												
Chunky-Okahatta (No.1)	400	200	13,000	900	40,500	172	6,200	318	22,000	820	91,897	173,597
Chunky-Okahatta (No.2)	150	75	4,875	600	27,000	140	5,040	127	8,800	307	34,405	80,120
Big Creek (No.2)	250	125	12,798	600	21,870	81	2,917	171	11,880	513	57,492	106,957
Big Creek (No.3)	110	55	2,844	1,200	43,740	40	1,459	128	8,910	225	25,216	82,169
Upper Leaf	250	125	8,125	900	40,500	109	3,920	190	13,200	513	57,492	123,237
West Bowie	100	50	3,250	600	27,000	64	2,300	86	5,940	205	22,974	61,464
Upper Bowie	100	50	3,250	600	27,000	64	2,300	86	5,940	205	22,974	61,464
Dry Creek	150	75	3,000	300	9,100	158	5,700	65	4,500	307	34,405	56,705
Sowashee	100	50	3,250	600	27,000	93	3,360	114	7,920	205	22,974	64,504
West Tallahala	150	75	4,875	600	27,000	140	5,040	127	8,800	307	34,405	80,120
Upper Tallahatta	100	50	3,250	600	27,000	64	2,300	86	5,940	205	22,974	61,464
Okatoma Creek	250	125	8,125	1,200	54,000	124	4,480	159	11,000	513	57,492	135,097
Okatoma (Blackley)	300	150	9,750	600	27,000	78	2,800	95	6,600	615	68,923	115,073
Oakohay	150	75	4,875	1,200	54,000	155	5,600	190	13,200	307	34,405	112,080
Oakey Woods (Station Creek)	150	75	4,875	600	27,000	62	2,240	94	6,600	307	34,405	75,120
Tallahoma	300	150	9,750	1,200	54,000	155	5,600	190	13,200	615	68,923	151,473
Okatibbee (Penders)	250	125	8,125	1,200	54,000	124	4,480	159	11,000	513	57,492	135,097
Bogue Homo	200	100	6,500	900	40,500	109	3,920	159	11,000	410	45,949	107,869
Souinlovey (Penantly)	250	125	8,125	1,200	54,000	124	4,480	159	11,000	513	57,492	135,097
Bucatunna (East)	250	125	8,125	1,200	54,000	124	4,480	159	11,000	513	57,492	135,097
Pat Harrison Water District												
Kittrell	329	164	10,660	1,013	45,727	95	3,430	332	22,958	674	75,535	158,310
Whetstone	256	128	8,320	788	35,570	74	2,672	259	17,910	525	58,836	123,308
West Tiger Creek	217	108	7,020	668	30,154	63	2,275	219	15,144	445	49,871	104,464
Thompson Creek	4,100	2,050	133,250	12,628	570,028	1,189	42,935	4,141	286,350	8,405	941,948	1,974,511
Flint Creek	600	300	19,500	1,848	83,419	174	6,283	606	41,905	1,230	137,846	288,953
Little Black Creek	400	200	13,000	1,232	55,612	116	4,189	404	27,937	820	91,897	192,635
Big Creek	400	200	13,000	1,232	55,612	116	4,189	404	27,937	820	91,897	192,635
Archusa Creek	400	200	13,000	1,232	55,612	116	4,189	404	27,937	820	91,897	192,635
U.S. Forest Service[1]												
Total All Projects	1,089	545	35,425	10,800	487,512	2,025	73,123	780	53,937	2,232	230,140	880,137
TOTALS	45,951	22,975	1,495,442	153,577	6,910,323	16,066	580,040	44,953	3,109,024	94,199	10,536,875	22,631,704

1. U.S. Forest Service data is for projects within the Pascagoula River Basin drainage area only.

CHART 23

Pascagoula River Basin
Average Summer Sunday and Annual Use in Activity Occasions for Potential Projects
and Increases at Early-Action Projects by 2015

Potential Projects (2015)	Normal Pool Size (*Acres*)	Boating Capacity: Average Summer Sunday Activity *Occasions*	Boating Capacity: Annual Activity Occasions	Swimming Capacity: Average Summer Sunday Activity Occasions	Swimming Capacity: Annual Activity Occasions	Camping Capacity: Average *Summer* Sunday Activity Occasions	Camping Capacity: Annual Activity Occasions	Picnicking Capacity: Average *Summer* Sunday Activity Occasions	Picnicking Capacity: Annual Activity Occasions	Other Activities: Average *Summer* Sunday Activity Occasions	Other Activities: Annual Activity Occasions	Annual Recreation Activity Occasions
Corps of Engineers												
Upper Escatawpa	2,900	1,450	94,250	30,537	1,378,440	3,306	119,380	7,337	507,353	16,704	1,872,017	3,971,440
Vancleave	360	180	11,700	3,791	171,126	410	14,805	911	62,996	2,074	232,433	493,060
Perkinston	1,900	950	61,750	20,007	903,116	2,166	78,214	4,807	332,404	10,944	1,226,494	2,601,978
Benndale	2,600	1,300	84,500	27,378	1,235,843	2,964	107,030	6,578	454,869	14,976	1,678,360	3,560,602
Leakesville	1,400	700	45,500	14,742	665,454	1,596	57,631	3,542	244,930	8,064	903,732	1,917,247
Bucatunna	3,800	1,900	123,500	40,014	1,806,232	4,332	156,429	9,614	664,808	21,888	2,452,988	5,203,957
Manasse	2,500	1,250	81,250	26,325	1,188,310	2,850	102,913	6,325	437,374	14,400	1,613,808	3,423,655
Graham	640	320	20,800	6,739	304,198	730	26,360	1,619	111,954	3,686	413,090	876,402
Moss	1,300	650	42,250	13,689	617,921	1,482	53,515	3,289	227,434	7,488	839,180	1,780,300
Tallasher	1,100	550	35,750	11,583	522,857	1,254	45,282	2,783	192,444	6,336	710,076	1,506,409
Waynesboro	7,000	3,500	227,500	73,710	3,327,269	7,980	288,158	17,710	1,224,646	40,320	4,518,662	9,586,235
Harleston	14,000	-	-	104,300	4,708,102	11,900	429,709	21,280	1,471,512	51,940	5,820,915	12,430,238
Taylorsville	3,500	-	-	26,075	1,177,026	2,975	107,427	5,320	367,878	12,985	1,455,229	3,107,560
Okatibbee	3,200	-	-	23,840	1,076,131	2,790	100,746	4,864	336,346	11,872	1,330,495	2,843,718
Tallahala	4,400	-	-	32,780	1,479,691	3,740	135,051	6,688	462,475	16,324	1,829,432	3,906,649
Bowie	5,500	-	-	40,975	1,849,613	4,675	168,815	8,360	578,094	20,405	2,286,788	4,883,310
Mize	3,600	-	-	26,820	1,210,657	3,060	110,496	5,472	378,389	13,356	1,496,807	3,196,349
Soil Conservation Service												
Chunky-Okahatta (No.1)	400	-	-	900	40,500	172	6,200	319	22,000	1,484	166,312	235,012
Chunky-Okahatta (No.2)	150	-	-	420	18,000	140	5,040	128	8,800	557	62,423	94,263
Big Creek (No.2)	250	-	-	900	40,500	64	2,300	128	8,800	928	104,001	155,601
Big Creek (No.3)	110	-	-	-	-	-	-	86	5,940	408	45,725	51,666
Upper Leaf	250	-	-	600	27,000	47	1,680	191	13,200	928	104,001	145,881
West Bowie	100	-	-	420	18,000	47	1,680	86	5,940	371	41,578	67,198
Upper Bowie	100	-	-	420	18,000	64	2,300	86	5,940	371	41,578	67,818
Dry Creek	150	-	-	600	27,000	47	1,680	65	4,500	557	62,423	95,603
Sowashee	100	-	-	420	18,000	54	1,945	86	5,940	371	41,578	67,463
West Tallahala	150	-	-	420	18,000	64	2,300	128	8,800	557	62,423	91,523
Upper Tallahatta	100	-	-	420	18,000	47	1,680	86	5,940	371	41,578	67,198
Okatoma Creek	250	-	-	1,200	54,000	31	1,120	160	11,000	928	104,001	170,121
Okatoma (Blackley)	300	-	-	1,200	54,000	78	2,800	128	8,800	1,113	124,734	190,334
Oakohay	150	-	-	1,800	81,000	78	2,800	191	13,200	557	62,423	159,423
Oakey Woods	150	-	-	600	27,000	62	2,240	96	6,600	557	62,423	98,263
Tallahoma	300	-	-	1,800	81,000	47	1,680	191	13,200	1,113	124,734	220,614
Bogue Homo	200	-	-	1,500	67,500	47	1,680	160	11,000	742	83,156	163,336
Souinlovey (Penantly)	250	-	-	1,200	54,000	62	2,240	160	11,000	928	104,001	171,241
Bucatunna (East)	250	-	-	1,200	54,000	62	2,240	160	11,000	928	104,001	171,241
Okatibbee	250	-	-	1,200	54,000	47	1,680	160	11,000	928	104,001	170,681
Long Creek	300	150	9,750	1,800	81,000	155	5,600	383	26,400	1,728	193,657	316,407
Upper Chickasawhay	300	150	9,750	1,800	81,000	155	5,600	383	26,400	1,728	193,657	316,407
Five Mile Creek	300	150	9,750	1,800	81,000	155	5,600	383	26,400	1,728	193,657	316,407
Shubuta	400	200	13,000	2,400	108,000	186	6,720	479	33,000	2,304	258,209	418,929
Yellow Creek	400	200	13,000	2,400	108,000	186	6,720	479	33,000	2,304	258,209	418,929
Lower Tallahala	400	200	13,000	2,400	108,000	186	6,720	479	33,000	2,304	258,209	418,929
Upper Black Creek	500	250	16,250	3,000	135,000	233	8,400	638	44,000	2,880	322,761	526,411
Lower Bogue Homo	500	250	16,250	3,000	135,000	233	8,400	638	44,000	2,880	322,761	526,411
Gaines Creek	500	250	16,250	3,000	135,000	233	8,400	638	44,000	2,880	322,761	526,411
Upper Escatawpa	400	200	13,000	2,400	108,000	186	6,720	479	33,000	2,304	258,209	418,929
Pat Harrison Waterway												
None												
U.S. Forest Service[1]												
Total All Projects	3,506	1,753	113,945	1,200	54,168	2,115	76,373	3,540	244,791	20,195	2,263,254	2,752,531
TOTALS	71,166	16,503	1,072,695	565,725	25,525,654	63,493	2,292,499	127,813	8,836,497	331,694	37,172,944	74,900,2[illegible]

1. U.S. Forest Service data is for projects within the Pascagoula River Basin drainage area only.

CHART 24

Pascagoula River Basin
Outdoor Recreation Facilities Needed at Proposed
Early-Action Projects

Early-Action Projects (1980)	Boat Ramps	Swimming Beaches (Acres)	Bath Houses (No.)	Parking for Swimming (Acres)	Camping Units (No.)	Picnic Units (No.)	Over-looks (No.)	Hiking Trails (Miles)
Corps of Engineers								
Taylorsville	12	18	18	54	210	354	2	7
Okatibbee	8	18	18	50	210	323	2	7
Tallahala	12	24	24	68	270	444	2	8
Bowie	16	28	28	84	300	555	2	6
Mize	12	18	18	55	210	364	2	7
Harleston	40	72	72	216	810	1,414	2	14
Soil Conservation Service								
Chunky-Okahatta (No. 1)	2	1.5	2	6	34	32	-	3
Chunky-Okahatta (No. 2)	1	1	1	3	28	13	-	3
Big Creek (No. 2)	1	1	1	3	16	17	-	3
Big Creek (No. 3)	1	2	2	6	8	13	-	3
Upper Leaf	1	1.5	2	6	22	19	-	3
West Bowie	1	1	1	3	13	9	-	3
Upper Bowie	1	1	1	3	13	9	-	3
Dry Creek	1	0.5	1	3	32	7	-	3
Sowashee	1	1	1	3	18	11	-	3
West Tallahala	1	1	1	3	28	13	-	3
Upper Tallahatta	1	1	1	3	13	9	-	3
Okatoma Creek	1	2	2	6	25	16	-	3
Okatoma (Blackley)	1	1	1	3	16	10	-	3
Oakohay	1	2	2	6	31	19	-	3
Oakey Woods (Station Creek)	1	1	1	3	12	9	-	3
Tallahoma	1	2	2	6	31	19	-	3
Okatibbee (Penders)	1	2	2	6	25	16	-	3
Bogue Homo	1	1.5	2	6	22	16	-	3
Bucatunna (East)	1	2	2	6	25	16	-	3
Souinlovey (Penantly)	1	2	2	6	25	16	-	3
Pat Harrison Waterway District								
Kittrell	1	2	2	6	19	33	-	3
Whetstone	1	1.5	2	6	15	26	-	3
West Tiger Creek	1	1	1	3	13	22	-	3
Thompson Creek	8	21	21	63	38	414	1	17
Flint Creek	2	3	3	9	35	61	-	20
Little Black Creek	2	2	2	6	23	40	-	3
Big Creek	2	2	2	6	25	40	-	3
Archusa Creek	2	2	2	6	25	40	-	3
U. S. Forest Service[1]								
Total All Projects	18	18	18	54	405	78	-	10
TOTALS	158	258.5	261	776	3,045	4,497	13	174

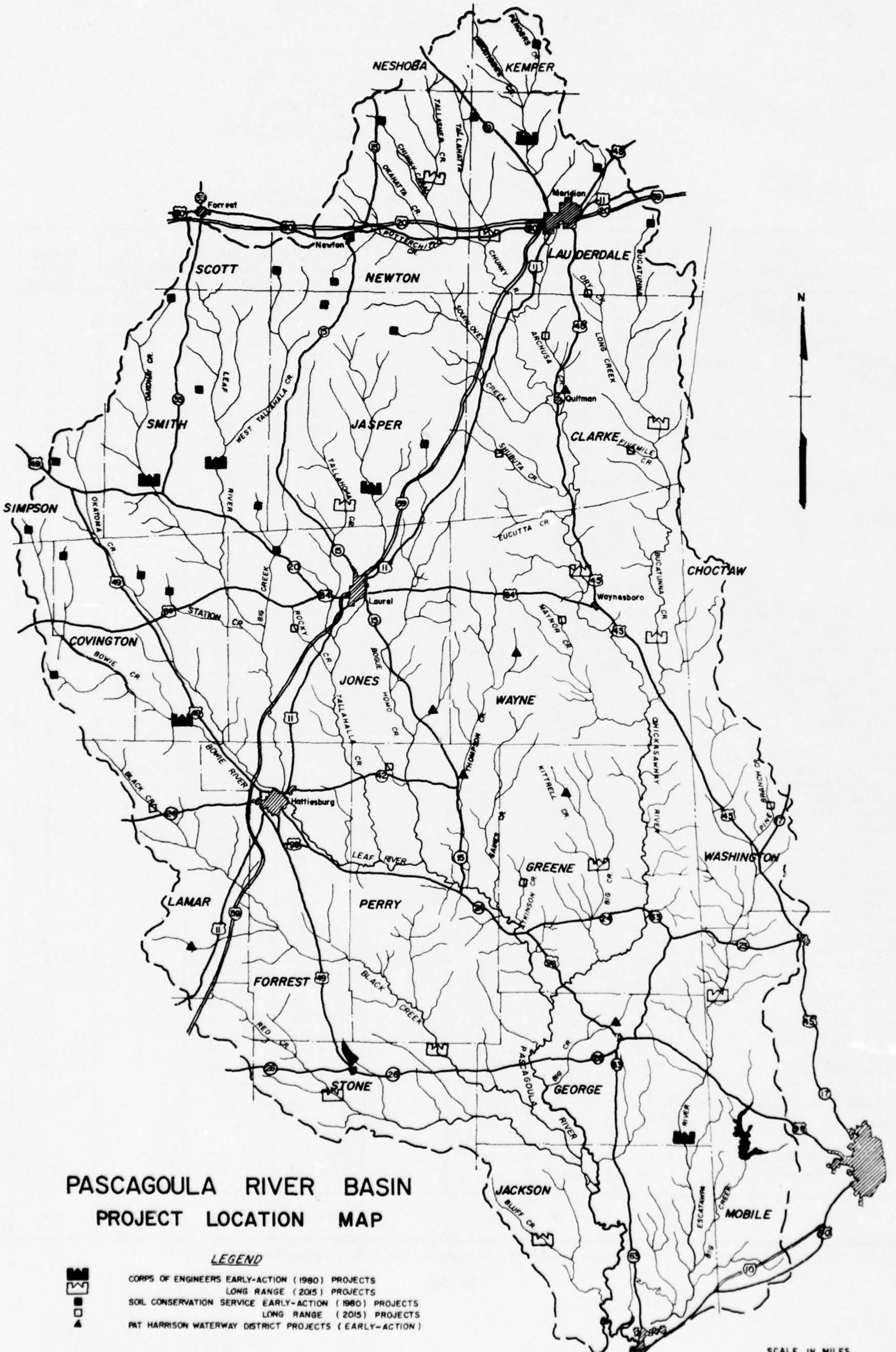
[1]U. S. Forest Service data is for projects within the Pascagoula River Basin drainage area only.

CHART 25

Pascagoula River Basin
Outdoor Recreation Facilities Needed at Potential Projects and
Additional Facilities Needed at Early-Action Projects by 2015

Potential Projects (2015)	Boat Ramps (No.)	Swimming Beaches (Acres)	Bath Houses (No.)	Parking for Swimming (Acres)	Camping Units (No.)	Picnic Units (No.)	Overlooks (No.)	Hiking Trails (Miles)
Corps of Engineers								
Upper Escatawpa	10	30.5	31	-	1,653	734	2	7
Vancleave	2	6.3	6	-	205	91	1	2
Perkinston	7	33.3	33	-	1,083	481	-	7
Benndale	9	45.6	46	-	1,482	658	2	5
Leakesville	5	24.6	25	-	798	354	2	4
Bucatunna	13	66.7	67	-	2,166	961	2	8
Manasse	9	43.9	44	-	1,425	633	2	6
Graham	2	11.2	11	-	365	162	1	3
Moss	5	22.8	23	-	741	329	2	4
Tallasher	4	19.3	19	-	627	278	2	4
Waynesboro	24	122.8	122	-	3,990	1,771	2	10
Harleston	-	173.8	174	-	2,380	2,128	-	10
Taylorsville	-	43.5	44	-	1,488	532	-	6
Okatibbee	-	39.7	40	-	1,396	486	-	6
Tallahala	-	55.6	56	-	1,870	669	-	5
Bowie	-	68.3	68	-	2,338	836	-	6
Mize	-	44.7	45	-	1,530	547	-	7
Soil Conservation Service								
Chunky-Okahatta (No.1)	-	1.5	2	-	86	32	-	1
Chunky-Okahatta (No.2)	-	0.7	1	-	70	13	-	1
Big Creek (No. 2)	-	1.5	2	-	32	13	-	1
Big Creek (No. 3)	-	-	-	-	-	9	-	1
Upper Leaf	-	1.0	1	-	23	19	-	1
West Bowie	-	0.7	1	-	24	9	-	1
Upper Bowie	-	0.7	1	-	32	9	-	1
Dry Creek	-	1.0	1	-	24	6	-	1
Sowashee	-	0.7	1	-	27	9	-	1
West Tallahala	-	0.7	1	-	24	13	-	1
Upper Tallahatta	-	0.7	1	-	16	9	-	1
Okatoma Creek	-	2.0	2	-	39	16	-	1
Okatoma (Blackley)	-	2.0	2	-	39	13	-	1
Oakohay	-	3.0	3	-	31	19	-	1
Oakey Woods	-	1.0	1	-	23	10	-	1
Tallahoma	-	3.0	3	-	24	19	-	1
Bogue Homo	-	1.5	2	-	23	16	-	1
Souinlovey (Penantly)	-	2.0	2	-	31	16	-	1
Bucatunna (East)	-	2.0	2	-	31	16	-	1
Okatibbee	-	2.0	2	-	24	16	-	1
Long Creek	1	3.0	3	-	77	38	-	4
Upper Chickasawhay	1	3.0	3	-	78	38	-	4
Five-Mile Creek	1	3.0	3	-	77	38	-	4
Shubuta	2	4.0	4	-	93	48	-	4
Yellow Creek	2	4.0	4	-	93	48	-	4
Lower Tallahala	2	4.0	4	-	93	48	-	4
Upper Black Creek	2	5.0	5	-	117	64	-	4
Lower Bogue Homo	2	5.0	5	-	116	64	-	4
Gaines Creek	2	5.0	5	-	117	64	-	4
Upper Escatawpa	2	4.0	4	-	93	48	-	4
Pat Harrison Waterway District								
None								
U. S. Forest Service[1]								
Total All Projects	12	2.0	2	-	423	354	-	10
TOTALS	119	922.3	927	-	27,537	12,784	18	170

[1] U. S. Forest Service data is for projects within the Pascagoula River Basin drainage area only.



PASCAGOULA RIVER BASIN
PROJECT LOCATION MAP

CHART 56

Chart 27 has been prepared to show the unsatisfied recreation demand remaining in 1980 after the completion of the recommended reservoir projects. The considered 2015 potential projects were also evaluated to project their effect on the recreation demand should they be constructed.

Much of the remaining demand for outdoor recreational areas and facilities can be met by a combination of Federal, State, county, municipal and private programs including:

1. Improvement of existing areas including both increasing the capacity and improvement of quality. All existing U.S. Forest Service, State, and local recreation should be expanded to accommodate more picnicking, camping, boating, swimming, and other related activities. Much of the presently programmed expansion has been taken into consideration in this report.

2. Adequate boat access developed on selected streams as well as for the proposed reservoirs. Adequate boat access should also be developed for the Mississippi Sound. Many of these boat access sites will be developed by the State of Mississippi, local governmental bodies, and private interests.

3. New area acquisition and development is necessary to relieve increasing use pressures on present recreation facilities, and to replace the loss of lands to construction of industry, housing, commerce, and transportation routes. Ideally, master plans should indicate acquisition in a pattern to achieve a "greenbelt" within urban growth limits, to make open space available to what will become the "core city" as urbanization progresses. Rezoning of flood-plains and vacant stream-bottoms should be accomplished to provide a nucleus for greenways within high density areas.

4. Preservation of natural, historical and cultural sites of local importance for public use.

5. The development of recreation facilities and related services by private and non-Federal interests within easy reach of large urban areas to accommodate some of the recreation demand generated by these areas.

In regard to hunting, the potential capacity of the present supply is adequate to satisfy the demand for all periods of the study if the resource is managed properly and is considered without regard to such limitations as conflicting land uses and accessibility or distribution of hunters in relation to opportunities. However, the proposed impoundments will inundate some of the basin's best wildlife lands. Because of this inundation, the Bureau of Sport Fisheries and Wildlife estimates 32,300 man-days of upland hunting will be lost per year by 1980. There will be an additional yearly loss of 25,500 man-days of this type of

CHART 27

Pascagoula River Basin
Projected Unsatisfied Demand and Needs with Proposed Public Projects
for the Years 1980 and 2015
in Activity Occasions

	Swimming	Boating	Camping	Picnicking
1980 Average Summer Sunday Demand	250,712	76,669	42,049	82,744
1980 Supply Without Proposed Projects	34,524	3,207	9,355	7,670
1980 Supply With Projects	153,577	22,975	16,066	44,953
1980 Unsatisfied Demand (Remaining)	62,611	50,487	16,628	30,121
1980 Needs Expressed in Facilities	104 Acres of Beach	100,974 Acres of Water	3,326 Camping Units	3,012 Picnic Tables
1980 Unsatisfied Demand as Percent of Average Summer Sunday Demand	25	66	39	36
2015 Average Summer Sunday Demand	861,532	266,904	144,399	284,345
2015 Supply Without Public Projects	34,524	3,207	9,355	7,670
2015 and 1980 Supply from Project Development	719,302	39,478	79,559	172,766
2015 Unsatisfied Demand Remaining	107,706	224,219	55,485	103,909
2015 Needs Expressed in Facilities	180 Acres of Beach	448,438 Acres of Water	11,097 Camping Units	10,391 Picnic Tables
2015 Unsatisfied Demand as a Percent of Average Summer Sunday Demand	13	84	38	37

hunting by 2015. This loss is offset somewhat by the improvement of waterfowl hunting. It is estimated that with the application of this plan 4,300 man-days of additional waterfowl hunting each year will be available by 1980. This figure will be complemented by 3,400 man-days of additional waterfowl hunting each year by 2015. With the application of this plan, a considerable area of water will be available for fishing. The Bureau of Sport Fisheries and Wildlife has allocated 246,000 man-days of fishing per year to the proposed reservoirs in 1980 and 894,500 man-days per year in 2015. This allocation is considerably below the fresh water fishing carrying capacity of the reservoirs for both of the target years. In addition, it appears certain that there will be sufficient salt-water sport fishing available in the target years.

SUGGESTED ADMINISTRATIVE AND FUNDING ARRANGEMENTS

Administration and funding of the recreation development for the Pascagoula River Basin may be handled through several methods depending on the construction agency and the various policies involved. Chart 28 shows the administrative and funding cost sharing arrangements possible under present laws and policies. It will be noted in Chart 28 that the principal agencies for administration and cost sharing are: "local organizations" (as defined in the Watershed Protection and Flood Prevention Act); "non-Federal public bodies" (as defined in the Federal Water Project Recreation Act); local governmental bodies; and various other specified State agencies. This emphasis on local administration is in keeping with current policies and legislation in Congress.

The required scale of development of the recreation resources throughout the basin makes full coordinated development desirable for realization of the full potential of the area's resources. The non-Federal or local responsibilities for recreation development should be coordinated through a local, basin-wide public body with adequate legal and financial capability to undertake unified and timely prosecution of the non-Federal responsibilities of the recreation plan. Fortunately, the Pat Harrison Waterway District, an agency with such coordinating powers, already exists in the State of Mississippi. This agency could assume the coordinating role in development of the non-Federal responsibilities for recreation in the Mississippi portion of the basin. The development of recreation facilities in the Alabama portion should be coordinated through the Alabama Department of Conservation.

Cost sharing and funding should follow the procedures outlined in Chart 28. Emphasis will be on non-Federal or local cost sharing or funding with assistance from the Federal Government, where permissible, through such legislation as the Watershed Protection and Flood Prevention Act, the Land and Water Conservation Fund Act, the Housing and Development Act, the Dingell-Johnson Act, the Pittman-Robertson Act, and the Federal Water Project Recreation Act.

CHART 28

Pascagoula River Basin
Possible Administrative and Funding Arrangements of Recreation Areas Under Present Laws and Regulations

Construction Agency	*Recreation Areas to be Administered by:*	Cost Sharing or Funding of Recreation Development by:
Corps of Engineers	Administration by "Non-Federal public bodies"[1] according to Public Law 89-72 (Federal Water Project Recreation Act) where a cost sharing and administration agreement has been obtained.	Funded as project cost but cost shared by non-Federal Public bodies[1] as set forth in Public Law 89-72 (Federal Water Project Recreation Act) where a cost sharing and administration agreement has been obtained.
	Administration by the U.S. Forest Service under terms of Aug. 13, 1964, memorandum of agreement between the Sec. of the Army and the Sec. of Agriculture of those project areas appropriate for administration by the U.S.F.S. as part of a national forest system.	Recreation area development funded by the U.S. Forest Service.
	Administration by the Corps of Engineers of recreation areas at projects that are not affected by Public Law 89-72 until June 30, 1980. After that time the administration policies of Public Law 89-72 shall apply.	Recreation areas that are a part of the initial development during project construction will be funded as part of project cost and not subject to cost sharing. Further development of these areas will be with 710 funds until June 30, 1980. After that time, the cost sharing of Public Law 89-72 will apply. All development of new areas (not part of the initial project) will be subject to cost sharing under Public Law 89-72.
Local organizations (sponsors) under Public Law 566 with assistance from Soil Conservation Service	Administration of recreation areas at public recreational developments by "local organizations"[2] according to Section 4 of the Watershed Protection and Flood Prevention Act as amended Sept. 27, 1962.	Recreation area development costs and modifications of the project for recreation will be shared by "local organizations"[2] and the Soil Conservation Service according to section 4 of P.L. 566. Some development may be funded by the Land and Water Conservation Fund Act.
	Privately owned and operated recreation areas administered by landowners.	Recreation area development funded by landowners.
	Administration by U.S. Forest Service when area lies on National Forest land.	Recreation area development costs funded by U.S. Forest Service.
Pat Harrison Waterway District	Administration of recreation areas by the Pat Harrison Waterway District or by State or local agencies.	Funding by State or local agencies with cost sharing under provision of Land and Water Conservation Fund Act of 1965.
		Funding by Pat Harrison Waterway District with cost sharing under provisons of Land and Water Conservation Fund Act of 1965.
	Administration of recreation areas by the U.S. Forest Serviceon National Forest land.	Recreation area development funded by the U.S. Forest Service.
U.S. Forest Service	Administration of recreation areas by the U.S. Forest Serviceon National Forest land.	Recreation area development funded by U.S. Forest Service.
		Land acquisition may be financed by the Land and Water Conservation Fund Act of 1965 (P.L. 88-578) and the Weeks Law of 1911.
State of Mississippi (and Alabama)	State Park System. (and Alabama Department of Conservation-Division of State Parks)	Funding by State Park System with cost sharing under provisions of the Land and Water Conservation Fund Act of 1965, and the Housing and Development Act of 1965.
	Mississippi Fish and Game Commission. (and Alabama Department of Conservation - Division of Game and Fish)	Funding for fishing areas could be under provisions of the Dingell-Johnson Act. Funding for hunting areas could be under provisions of the Pittman-Robertson Act. State funds may also be used for both types of areas.
Local governmental bodies	The Administration by local Governmental bodies.	Funding by local Governmental bodies with cost sharing under provisons of the Land and Water Conservation Fund Act of 1965, and the Housing and Development Act of 1965.
Bureau of Sport Fisheries and Wildlife	Administration of wildlife refuges by Bureau of Sport Fisheries and Wildlife.	Land acquisition may be financed by the Land and Water Conservation Fund Act of 1965.

1. Non-Federal public bodies - public entities such as States, counties, municipalities, recreation districts or other special-purpose districts with sufficient authority to participate under the provisions of the bill.

2. Any State, political subdivision thereof, soil or water conservation district, flood prevention or control district, or combinations thereof, or any other agency having authority under State law to carry out, maintain and operate the works of improvement; or any irrigation or reservoir company, water users' association, or similar organization having such authority and not beirg operated for profit.

PART V. EVALUATION

BENEFITS

Tangible - In this study, an attempt has been made to measure tangible benefits that are expected to occur with the construction of the various reservoir projects.

The expected number of activity occasions (from Chart 22) at each early-action project has been converted to recreation days in Chart 29 by dividing the total estimated activity occasions for each water resource project proposed by 2.3 (assuming that a recreation day involves 2.3 activities). The total recreation days estimated to occur in 1980 at the proposed early-action reservoirs is 9.8 million. In keeping with Supplement Number 1 of Senate Document Number 97, monetary unit values have been assigned to a recreation day at each of the proposed reservoirs.

By multiplying the annual recreation days expected to occur at each reservoir by the monetary unit value given a recreation day at that reservoir, an estimate of annual recreation benefits for each reservoir is obtained. This operation is shown in Chart 29 for the proposed early-action projects and in Chart 30 for the long-range projects.

In addition, both charts present data obtained from the Bureau of Sport Fisheries and Wildlife about the estimated annual fishing and hunting man-days expected to occur at each reservoir. Monetary unit values have been given to a man-day of each of the various fishing and hunting activities except upland game hunting. These estimated values may be found in the footnotes of the charts.

These values have been multiplied by the relevant expected man-days of hunting or fishing and an Annual Total Recreation Benefit figure has been obtained for each reservoir. It is estimated that the total benefits from all forms of recreation will total $10.2 million each year, by 1980, at the early-action projects.

Intangible - Other investments might well achieve monetary returns comparable with the returns expected from the investments proposed in this recreation appendix. It is in the realm of intangible benefits that investments in recreation often obtain more merit than other types of investments. Current and future problems of the United States seem to be more in the nature of improving the depth and richness of the life of the citizenry, rather than problems associated with the production and distribution of wealth. Recreation opportunities can supplement the stimuli people experience and, as a result, they will lead a richer and fuller life.

CHART 29

Pascagoula River Basin
Estimated Recreation Benefits from Proposed
Early-Action Projects (1980)

Reservoirs	Estimated Annual Recreation Activity Occasions	Annual Activity Occasions Converted to Recreation Days	Estimated Value of Recreation Days	Annual Recreation Benefits $	Annual Estimated Reservoir Fishing in Man-Days of Use 1980	Estimated Annual Tailwater Fishing in Man-Days	Estimated Increased Man-Days of Waterfowl Hunting	Total Annual Recreation Benefits[1] $
Corps of Engineers							3,100	9,300
Taylorsville	1,685,558	732,851	$.95	696,208	17,250	2,000		715,958
Okatibbee	1,541,082	670,036	.95	636,534	-	-		636,534
Tallahala	2,118,987	921,299	.95	875,234	19,200	5,000		900,684
Bowie	2,648,734	1,151,623	.95	1,094,042	26,250	4,000		1,125,292
Mize	1,733,717	753,790	.95	716,101	17,800	2,000		736,401
Harleston	6,742,234	2,931,406	.95	2,784,836	72,000	5,000		2,863,086
Soil Conservation Service							396	1,188
Chunky-Okahatta (No. 1)	173,597	75,477	1.25	94,346	2,200			96,546
Chunky-Okahatta (No. 2)	80,120	34,835	1.25	43,544	825			44,369
Big Creek (No. 2)	106,957	46,503	1.25	58,129	1,375			59,504
Big Creek (No. 3)	82,169	35,726	1.25	44,657	605			45,262
Upper Leaf	123,237	53,581	1.25	66,976	1,375			68,351
West Bowie	61,464	26,723	1.25	33,404	550			33,954
Upper Bowie	61,464	26,723	1.25	33,404	550			33,954
Dry Creek	56,705	24,654	1.25	30,817	825			31,642
Sowashee	64,504	28,045	1.25	35,056	550			35,606
West Tallahala	80,120	34,835	1.25	43,544	825			44,369
Upper Tallahatta	61,464	26,723	1.25	33,404	550			33,954
Okatoma Creek	135,097	58,738	1.25	73,423	1,375			74,798
Okatoma (Blackley)	115,073	50,032	1.25	62,540	1,650			64,190
Oakohay	112,080	48,730	1.25	60,913	825			61,738
Oakey Woods (Station Creek)	75,120	32,661	1.25	40,826	825			41,651
Tallahoma	151,473	65,858	1.25	82,323	1,650			83,973
Okatibbee	135,097	58,730	1.25	73,413	1,375			74,788
Bogue Homa	107,869	46,900	1.25	58,625	1,100			59,725
Souinlovey (Penantly)	135,097	58,730	1.25	73,413	1,375			74,788
Bucatunna (East)	135,097	58,730	1.25	73,413	1,375			74,788
Pat Harrison Waterway District							610	1,830
Kittrell	158,310	68,830	1.25	86,037	1,809			87,846
Whetstone	123,308	53,612	1.25	67,015	1,408			68,423
Flint Creek	288,953	125,632	1.25	157,040	--			157,040
Little Black Creek	192,635	83,754	1.25	104,693	2,200			106,893
Big Creek	192,635	83,754	1.25	104,693	2,200			106,893
Archusa Creek	192,635	83,754	1.25	104,693	2,200			106,893
West Tiger Creek	104,464	45,419	1.25	56,774	1,193			57,967
Thompson Creek	1,974,511	858,483	1.25	1,073,104	20,550	2,000		1,096,154
Total All Forest Service Projects	880,137	382,668	1.25	478,335	11,160		203	490,104
TOTAL	22,631,704	9,839,845		10,151,509	217,000	20,000	4,309	10,406,436

[1] Reservoir fishing values at $1.00 per day. Tailwater fishing valued at $1.25 per day. Waterfowl hunting valued at $3.00 per day.

CHART 30

Pascagoula River Basin
Estimated Annual Recreation Benefits from Potential Projects
and Ultimate Development of Early-Action Projects

Potential Projects (2015)	Annual Recreation Activity Occasions	Annual Recreation Days	Value of Recreation Day	Annual Recreation Benefits	Annual Man-days of Reservoir Fishing[1]	Annual Man-days of Tailwater Fishing[1]	Total Annual Recreation Benefits
Corps of Engineers							
Upper Escatawpa	3,971,440	1,726,714	$.95	$1,640,378	31,900		$1,672,278
Vancleave	493,060	214,374	.95	203,655	3,960		207,615
Perkinston	2,601,978	1,131,295	.95	1,074,730	20,900		1,095,630
Benndale	3,560,602	1,548,088	.95	1,470,684	28,600		1,499,284
Leakesville	1,917,247	833,586	.95	791,907	15,400		807,307
Bucatunna	5,203,957	2,262,590	.95	2,149,460	41,800		2,191,260
Manasse	3,423,655	1,488,545	.95	1,414,118	27,500		1,441,618
Graham	876,402	381,044	.95	361,992	7,040		369,032
Moss	1,780,300	774,043	.95	735,341	14,300		749,641
Tallasher	1,506,409	654,960	.95	622,212	12,100		634,312
Waynesboro	9,586,235	4,167,928	.95	3,959,532	77,000		4,036,532
Harleston	19,172,472	8,335,857	.95	7,919,064	275,000	5,000	8,200,314
Taylorsville	4,793,118	2,083,964	.95	1,979,766	68,000	2,000	2,050,266
Okatibbee	4,384,800	1,906,435	.95	1,811,113	-		1,811,113
Tallahala	6,025,636	2,619,842	.95	2,488,850	83,000	5,000	2,578,100
Bowie	7,532,044	3,274,802	.95	3,111,062	106,000	4,000	3,222,062
Mize	4,930,066	2,143,507	.95	2,036,332	70,000	2,000	2,108,832
Soil Conservation Service							
Chunky-Okahatta (No. 1)	408,609	177,656	$1.25	222,070	8,000		230,070
Chunky-Okahatta (No. 2)	174,383	75,819	1.25	94,774	3,000		97,774
Big Creek (No. 2)	262,558	114,156	1.25	142,695	5,000		147,695
Big Creek (No. 3)	133,834	58,189	1.25	72,736	2,200		74,936
Upper Leaf	269,118	117,008	1.25	146,260	5,000		151,260
West Bowie	128,662	55,940	1.25	69,925	2,000		71,925
Upper Bowie	129,282	56,210	1.25	70,262	2,000		72,262
Dry Creek	152,308	66,221	1.25	82,776	3,000		85,776
Sowashee	131,967	57,377	1.25	71,721	2,000		73,721
West Tallahala	171,643	74,627	1.25	93,284	3,000		96,284
Upper Tallahatta	128,662	55,940	1.25	69,925	2,000		71,925
Okatoma Creek	305,218	132,703	1.25	165,879	5,000		170,879
Okatoma (Blackley)	305,407	132,786	1.25	165,983	6,000		171,983
Oakohay	271,503	118,045	1.25	147,556	3,000		150,556
Oakey Woods	173,383	75,384	1.25	94,230	3,000		97,230
Tallahoma	372,087	161,777	1.25	202,221	6,000		208,221
Bogue Homo	271,205	117,915	1.25	147,394	4,000		151,394
Souinlovey (Penantly)	306,338	133,190	1.25	166,487	5,000		171,487
Bucatunna (East)	306,338	133,190	1.25	166,487	5,000		171,487
Okatibbee	305,778	132,947	1.25	166,184	5,000		171,184
Long Creek	316,407	137,568	1.25	171,960	3,300		175,260
Upper Chickasahay	316,407	137,568	1.25	171,960	3,300		175,260
Five Mile Creek	316,407	137,568	1.25	171.960	3,300		175,260
Shubuta	418,929	182,143	1.25	227,679	4,400		232,079
Yellow Creek	418,929	182,143	1.25	227,679	4,400		232,079
Lower Tallahala	418,929	182,143	1.25	227,679	4,400		232,079
Upper Black Creek	526,411	228,874	1.25	286,093	5,500		291,593
Lower Bogue Home	526,411	228,874	1.25	286,093	5,500		291,593
Gaines Creek	526,411	228,874	1.25	286,093	5,500		291,593
Upper Escatawpa	418,929	182,143	1.25	227,679	4,400		232,079
Pat Harrison Waterway							
Kittrell	158,310	68,830	1.25	86,038	6,580		92,618
Whetstone	123,308	53,612	1.25	67,015	5,120		72,135
West Tiger Creek	104,464	45,419	1.25	56,774	4,340		61,114
Thompson Creek	1,974,511	858,483	1.25	1,073,104	80,000	2,000	1,155,604
Flint Creek	288,953	125,632	1.25	157,040	-		157,040
Little Black Creek	192,635	83,754	1.25	104,692	8,000		112,692
Big Creek	192,635	83,754	1.25	104,692	8,000		112,692
Archusa Creek	192,635	83,754	1.25	104,692	8,000		112,692
U.S. Forest Service							
Total All Projects	2,752,531	1,196,753	1.25	1,495,941	89,442		1,585,383
Total (All Projects)	96,651,856	42,022,543		41,868,908	1,215,182	20,000	43,104,090

1. Tailwater fishing valued at $1.25 per day. Reservoir fishing valued at $1.00.

Many different types of recreation opportunities will be available at the proposed recreation areas. Recreators, therefore, will be able to satisfy a wide range of outdoor interest without having to utilize excessive time or space which, in the future, are likely to be among our critical resources. The wide range of recreation experiences that will be available might also result in the users achieving a more complete understanding of nature.

In addition, projects proposed in the basin, particularly large bodies of water, may be considered as offering high quality aesthetic experiences having intangible value. Lastly, some studies have indicated that in an urban area mental and physical health can be improved by providing additional recreation facilities. Although no effort has been made in this appendix to ascertain the amount of recreation activity an individual needs to achieve a desired level of health, some intangible benefit seems apparent here since, by 2015, an urban atmosphere may well exist over a much larger portion of the watershed than it does today.

Although most of the visitors to the proposed recreation areas will receive some of these above benefits, it does not appear that the project costs will be significantly altered in order to supply them. Planning criteria employed in this basin study are based on standards that include environmental considerations of space, buffer zones, and landscaping. The costs of such design are not significantly higher, but it is felt that such considerations are necessary in order to achieve a quality outdoor recreation experience.

The basic problem of benefit evaluation is the terming of acknowledged benefits, natural beauty, and environmental quality as "intangible." They are intuitively recognized although not rigorously computable, a subjective judgement as opposed to an objective monetary evaluation. Restrictions upon bulldozing, overhead powerline placement, and deep road cuts where contour lines could be followed to avoid damage to landscape are desirable in site planning. More examples of low-cost actions to yield high intangible benefits would be clearing of scenic vistas on roadsides, selection of native materials for buildings, and setting of buildings within tree groves where this would create harmony of scenery. Maximum enhancement of the character of the site should take precedence over least-cost construction consideration, rather than allowing benefit-cost ratios to be sole criteria for planning decisions.

COST

Data presently available regarding estimated recreation at the proposed early-action reservoirs are shown in Chart 31. Additional information regarding recreation cost is given in the summary report.

COMPARISON OF BENEFITS AND COST

Comparison of benefits and costs is treated in the summary report with consideration given to all project purposes.

CHART 31

Pascagoula River Basin
Cost of Construction and/or Installation of Recreation Facilities
at Proposed Early-Action Reservoirs

Reservoirs	Capital Cost
Corps of Engineers	
Taylorsville	$1,323,000
Okatibbee	1,227,000
Tallahala	1,613,000
Bowie	1,928,000
Mize	1,323,000
Harleston	4,793,000
Soil Conservation Service	
Chunky - Okahatta No. 1	283,935
Chunky - Okahatta No. 2	173,526
Big Creek No. 2	187,338
Big Creek No. 3	128,771
Upper Leaf	221,248
West Bowie	149,842
Upper Bowie	149,842
Dry Creek	184,561
Sowashee	156,947
West Tallahala	173,526
Upper Tallahala	156,947
Okatoma Creek	235,856
Okatoma (Blackley)	200,966
Oakohay	217,105
Oakey Woods (Station Creek)	145,105
Tallahoma	268,072
Okatibbee (Penders)	235,856
Bogue Homo	210,637
Bucatunna (East)	235,856
Souinlovey (Penantly)	235,856
Pat Harrison Waterway District	
Kittrell	987,000
Whetstone	768,000
West Tiger Creek	651,000
Thompson Creek	1,500,000
Flint Creek	1,500,000
Little Black Creek	1,000,000
Big Creek	1,000,000
Archusa Creek	1,000,000
U. S. Forest Service Projects	1,414,000
TOTAL	$25,978,792

COST ALLOCATIONS, COST SHARING, AND REIMBURSEMENT

Cost allocations and reimbursements are discussed in the various construction agencies authorizing reports. Cost sharing for recreation development was discussed previously under Part IV of this appendix in the section entitled "SUGGESTED ADMINISTRATIVE AND FUNDING ARRANGEMENTS."

Least Cost Alternative - Most of the needs of the recreation market are for facilities for picnicking, swimming, camping, and hiking could be met through the expansion of existing recreation areas and the construction of new areas. The cost of providing these extra facilities might be approximately the same as it would be for providing those facilities at the proposed early-action reservoir projects. However, in the case of other water-dependent general outdoor recreation activities, there is a basic shortage of water acreage in the basin which would necessitate the construction of reservoirs to meet the unsatisfied demand for these activities. This could be done through the construction of single-purpose recreation reservoirs.

Estimated costs for single-purpose reservoirs of the same size and at the same location (or nearby) as the proposed multiple-purpose Corps of Engineers reservoirs are shown in Chart 32. Comparisons between multiple-purpose and single-purpose structures were not made on all the structures proposed by the Soil Conservation Service. However, an analysis was made to assure that multiple-purpose structures were less costly than single-purpose structures as a means of satisfying the purpose and achieving the desired benefits of the plan. The analysis indicated that the total cost for multiple-purpose flood prevention and recreation structure was about the same as for a single-purpose structure for recreation.

Additional data about least cost alternatives are given in the summary report.

CHART 32

Pascagoula River Basin
Estimated Single-Purpose Recreation Reservoir Cost of Initial Project
Proposed Corps of Engineers Reservoirs

Reservoir	First Cost	Annual Cost
Okatibbee	(under construction)	
Harleston	$39,400,000	$1,623,000
Taylorsville	18,700,000	770,000
Tallahala	10,400,000	438,000
Bowie	17,900,000	732,000
Mize	10,700,000	462,000

PART VI. COORDINATION WITH OTHER INTERESTS

Preparation of this report has been fully coordinated with other Federal and non-Federal agencies, and interagency working level meetings were held as needed. Attending these meetings were representatives of the Corps of Engineers, the Soil Conservation Service, the Economic Research Service, the Forest Service, the Bureau of Sport Fisheries and Wildlife, and the Pat Harrison Waterway District. Coordination with the State of Mississippi was conducted primarily through the Pat Harrison Waterway District, a legal body of the State with wide powers to develop the water resources and area roughly corresponding to the Pascagoula River Basin. The Executive Director of the Waterway District participated actively in the study, supplied basic data and, as desired by the Bureau of Outdoor Recreation, arranged meetings with other State agencies and with county and local groups. Coordination with the State of Alabama was conducted through the Alabama Department of Conservation.

Other agencies of the State of Mississippi that cooperated in the preparation of this appendix, principally through the provision of supply data, were the Mississippi Game and Fish Commission, the Mississippi State Park Commission, and the Mississippi Forestry Commission.

The Bureau of Sport Fisheries and Wildlife has prepared a report outlining the demand, supply, and need of fish and wildlife resources in the Pascagoula River Basin. Information from their report has been drawn upon in the preparation of this appendix.

PART VII. CONCLUSIONS

Within the Pascagoula River Basin, the supply of outdoor recreation resources and facilities is far short of the existing demand for such facilities. By the years 1980 and 2015, this imbalance will increase. The greatest projected recreation need in the basin is for water areas to satisfy the demand for boating and swimming. While some of the unsatisfied demand in these activities will be met by the private sector, by river improvement, and by more access areas to the Sound near the mouth of the Pascagoula River, such projects, it is estimated, could handle only a fraction of the unsatisfied demand.

Of the plan features, the proposed multipurpose impoundments will satisfy the largest amount of outdoor recreation activities. It is the view of this agency that each proposed project should offer the public a balanced range of recreational activities such that there shall be no predominance of one activity that would be in conflict with the others.

If development of facilities at each of the reservoirs proposed for the basin were of the magnitude suggested in this report, there would still be a need for more facilities. The private sector must provide increased opportunities of a high quality if the outdoor recreational needs of the basin population are to be met. Camping and picnicking facilities can be provided at appropriate sites along the Pascagoula and its tributaries and maintained by local, county, or municipal interest groups. A large portion of the unsatisfied demand for boating can be satisfied by providing additional public access areas and boat launching ramps in the lower reaches of the Pascagoula River. Pollution abatement would greatly enhance public use of the beach area from Biloxi to Gulfport for swimming.

The net effect of the construction of the proposed reservoirs upon fish and wildlife will be favorable. Fresh-water fishing demand will be adequately met in both the target years if these works are installed. Although the man-days of upland game hunting possible within the basin will diminish because of the reduction in the acreage of hardwood trees, this loss is partially offset by an increase in the man-days of waterfowl hunting that should be possible.

PART VIII. RECOMMENDATIONS

In order to meet a substantial portion of the growing unsatisfied demand for outdoor recreation within the Pascagoula River Basin, the Bureau of Outdoor Recreation recommends that:

1. The recreation plan which has been outlined herein be implemented to the degree feasible at the time of development.

2. Outdoor recreational opportunities be provided in the basin at the level specified in the plan.

3. Black and Beaver Dam Creeks be maintained as free-flowing streams.

4. Related programs such as the development of service industries, land-use controls, natural beauty, public health, pollution abatement, and access be promoted by the responsible State, local and private organizations.

5. Sufficient land be acquired at any development to allow for long-range expansion particularly at the early-action projects.

6. A continuing program of coordination be maintained between all State, Federal, and local outdoor recreation agencies and periodic review of the basin's recreation resources be implemented so as to assure that all recreational development be in accord with and conform to the respective recreation plan.

7. Recreation be studied as a purpose in all future water project formulations.

8. The private sector be informed by the responsible State and local agencies as to the need for and the advantages of offering high quality private outdoor recreational facilities and services.

9. The respective State and local governments review their existing laws to determine if there is a need for revising existing statutes to promote the proper development and use of the basin's recreational resources.

10. City, county, State and regional planning commissions and departments should continue emphasis on planning for acquiring and administering greenspace and parks wherever housing and industrial expansion planning occurs. Consolidation of city and county systems should be studied where urbanization does or will engulf both areas.

11. Increased budgets should be planned by all park and recreation systems to bring development and maintenance activities in line with the higher expenditures of other states and regions. Quality alone will assure realization of public visitation, and satisfaction, and will deter vandalism and misuse.

PASCAGOULA RIVER COMPREHENSIVE BASIN STUDY

APPENDIX I

A REPORT ON THE FISH AND WILDLIFE ASPECTS OF THE PASCAGOULA RIVER BASIN, MISSISSIPPI AND ALABAMA

This report was prepared for use by all cooperating agencies and presented to the District Engineer, Mobile District, Corps of Engineers, as Chairman of the Coordinating Committee.

Prepared by the Bureau of Sport Fisheries and Wildlife, Department of the Interior, as a contribution to the Pascagoula River Comprehensive Basin Study

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UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE
PEACHTREE-SEVENTH BUILDING
ATLANTA, GEORGIA 30323

July 12, 1967

District Engineer
U. S. Army, Corps of Engineers
Mobile, Alabama

Dear Sir:

The Bureau of Sport Fisheries and Wildlife, in cooperation with the Mississippi Game and Fish Commission and the Alabama Department of Conservation, has conducted preliminary investigations of the fish and wildlife resources of the Pascagoula River Basin, Mississippi and Alabama. These investigations are part of a comprehensive study and analysis of basin needs for development of navigation and improvement for flood control, hydropower, water supply, water quality, recreation, fish and wildlife, and other water-related uses being conducted by various Federal and State agencies.

This report presents basic information about the magnitude of sport fishing, hunting, and commercial fisheries, and resource requirements to years 1980 and 2015 for sport fishing and hunting. Demands are based upon present and future human populations. Resource capacities are based on acres of classified habitat evaluated in terms of potential fish and wildlife populations they could support under average levels of management. Needs, for the purpose of this study, are considered as increased demand over base year 1960.

Authority

The Bureau of Sport Fisheries and Wildlife is authorized to participate in the comprehensive study of the Pascagoula River Basin by the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). The study has been conducted in accordance with the planning concepts of Senate Document 97, 87th Congress, 2d session, approved May 15, 1962, and its Supplement No. 1, dated June 4, 1964.

Measurement of Demand

Existing human populations and population projections for the Pascagoula River drainage basin, provided in the Economic Base

Study, Appendix E, were utilized in estimating fishing and hunting demand. Only that segment of the population 12 years and older was considered as potential fishermen and hunters. Per capita demand factors were obtained from unpublished Census South data compiled by the U. S. Bureau of the Census during the 1960 Survey of Fishing and Hunting. These were employed to arrive at man-day demand figures for subareas and the Pascagoula Basin. Census South data provided man-day fishing and hunting demand factors for the rural and urban portions of the population. Demand was calculated separately for each, and the resulting man-day figures were combined to obtain estimated total demand (table 1).

Measurement of Supply of Fish and Wildlife Resources

Wildlife. Basin wildlife resources were inventoried as a basis for establishing potential hunting capacity. Major land-use types in the basin were evaluated, with the assistance of biologists of the Mississippi Game and Fish Commission, to establish average wildlife populations, sustained annual yield, and man-days expended per kill (table 2). Harvestable wildlife per acre, expressed in man-days of hunting, was determined by using game population figures, maximum sustained harvest, and the number of man-days of hunting expended per unit of game harvested (table 3). Basin and subarea capacities for supporting hunting were in turn estimated by using derived man-day hunting capacity per acre and land-use acreages (table 4), compiled as a part of the base study by the U. S. Department of Agriculture. Table 5 contains estimated man-days of hunting capacity for all periods of project analysis.

Waterfowl were not included in calculations of hunting capacity, although waterfowl hunting occurs on small scattered areas of good natural habitat. Present available supplies of waterfowl are below that now needed to meet demand throughout the basin, and management of selected habitat areas is expected to supply only a small portion of projected demand. Preservation of valuable wetlands and marsh areas is particularly needed in the basin.

It should be recognized that calculations of hunting capacities are based on maximum sustained harvest figures, and as such are theoretical. It assumes accessibility to all areas and a uniform distribution of hunting in keeping with wildlife populations. While hunting pressures this high or higher are occurring on small areas, they will not be realized, without careful planning, over an area as broad as the basin. Posting, competing or conflicting land use, hunter acceptance of crowding, and the difficulty of

achieving uniform distribution of hunters all militate against realization of the full potential. However, the Pascagoula River Basin presently supports good populations of forest game with the exception of the extreme lower Coastal subarea, and hunter opportunity is probably higher than in any other basin in Mississippi. Large timber company holdings, National forest units, and State-operated wildlife management areas on public and private lands are available for public hunting.

Although our calculations have indicated ample potential for hunting basinwide, careful husbandry of the better resource areas is necessary. The analysis of habitat productivity (table 3) points up this important consideration for future planning. The mixed bottom-land hardwood habitat type has, by far, the greatest capacity for supporting hunting. Although it makes up only 10 percent of the area of the basin, it provides the capacity for almost 25 percent of the available hunting. Future planning should recognize the important role played by these bottom-land hardwoods in meeting hunting demand.

Unequal distribution of future demand to basin wildlife capacities will result from a projected large human population increase within the Coastal subarea. Estimated future hunter demand for this four-county area can be met through expansion and intensive management of existing wildlife basin programs both public and private in the Coastal and in the other two subareas. Plate 1 shows the existing public wildlife facilities in the study area.

The Pascagoula Basin contains areas of importance to ornithologists, herpetologists, bird watchers, and those who enjoy observing all kinds of nature. The Mississippi coast offers excellent areas for observation of marsh, shore, wading, and pelagic birds. The Gulf Island National Wildlife Refuge, composed of 749 acres, provides bird watching opportunity for a variety of shore and pelagic birds. Migrants en route to South America and islands to the south often stop for short periods when they encounter adverse weather conditions, providing bird watchers unusual opportunities to observe them at close range. Western bird species stray into the basin during migration periods and can be seen along the coastal area where they stop because of the water barrier. The swallowtail kite (Elanoides forficatus forficatus), whose range is chiefly river swamps of Florida, South Carolina, and Louisiana, is known to be present, and the Eastern brown pelican (Pelecanus occidentalis carolinensis), recently reduced in number because of some unknown factor, is also in residence. A remnant flock of sandhill cranes

(*Grus canadensis pratensis*), located in the Coastal subarea, furnishes a unique opportunity for study of this unusual bird.

Biologists of the Mississippi Game and Fish Commission indicate the Coastal subareas of the Pascagoula and Pearl Basins, during migration periods, as the best in this State to engage in the sport of bird watching. Bird watching activity in the basin is believed to approach the national average and would account for about 23,000 people being engaged locally in this activity in 1965. Assuming 20 field trips per year per individual, this would account for about 460,000 man-days of bird watching.

The Black Creek primitive float stream developed by the U. S. Forest Service, in excellent woodland habitat of the lower Leaf subarea, offers scouts and other groups an unusual opportunity to study stream and forest-dwelling wildlife in addition to primitive boating and camping. The De Soto and Bienville National Forest units, scattered throughout the basin, offer additional opportunities for nature study. The yellow-blotched sawback turtle (*Graptemys flavim aculata*) is unique to the Pascagoula Basin, and the Alabama map turtle (*Graptemys pulchra*) occurs here as well as in the adjoining Pearl Basin.

Fresh-Water Sport Fisheries. It was necessary to inventory areas of fresh-water habitat in order to establish a breakdown of the different types of fishing waters of varying capacities in the basin. Acres of fresh water were inventoried as follows: natural lakes from Permanent Water Inventory, U. S. Department of the Interior; public fishing lakes developed by the State and U. S. Forest Service from records of these agencies; streams by statistical sampling and acreage measurements; reservoirs from the Corps of Engineers and the Pat Harrison Waterway District; and farm ponds from Soil Conservation Service records. No attempt was made to separate fee fishing lakes from other private water bodies. The Southeast is presently experiencing a rapid growth of this industry. Plate 2 shows the existing public fresh-water fishery resources in the study area.

The appraisal of the man-day fishing capacity of the basin's fresh water was based primarily on (1) the standing crop of sport fishes, (2) ratio of the standing crop to the harvestable crop, and (3) average catch in pounds per man-day.

The standing crop, measured in pounds of fish per acre of water, is used as an index of the productivity of a given body of water. The standing crop will vary since habitat quality, harvest success, management of waters, fish migrations, and many other factors are

variable from year to year. To establish capacities of basin waters, an average harvestable crop of one-fourth the standing crop was established with the help of biologists of the Mississippi Game and Fish Commission. It was mutually agreed to use 2 pounds of fish as a standard harvest per man-day. A tabulation of the various types of habitat and their respective capacities is shown in tables 7 and 8.

The calculated fishing capacities are based on creel acceptability standards which are subject to variability. With low fishing pressure, the catch per angler could easily exceed 2 pounds per man-day, while under high fishing pressure a lesser catch might be acceptable. True fishing capacity is reached when increasing fishing pressure has decreased fishing success to the extent that the number of new fishermen being attracted is balanced by those who stop fishing because of an unsatisfactory creel return. This minimum acceptable creel is understandably nebulous and will vary by location, type of fishing, tolerance to crowding and disturbance, past fishing experience, availability of other fishing, and other factors. The 2 pounds per man-day average catch was judged a realistic standard for this basin.

The basin contains some of the best float and wade fishing streams found in the State. However, municipal and industrial pollution below Hattiesburg on the Leaf River, below Laurel on Tallahala Creek, and below Meridian on Okatibbee Creek reduces the sport fishing value of these streams for varying distances. Red and Black Creeks are relatively clear of pollution and are heavily used by float and wade fishermen. In recent years, the U. S. Forest Service established a float stream recreation area on Black Creek equipped with primitive boat-launching facilities. This type of fishing opportunity is much sought after by a segment of sport fishermen and is not replaceable with other types of fishing waters.

Several fishery investigations are underway in the Pascagoula Basin including an anadromous fish study, involving an assessment of the importance of the striped bass in coastal streams in Mississippi.

The present supply of sport fishing and hunting opportunities in the Pascagoula Basin is illustrated in plates 3 and 4.

Commercial Fisheries. Fresh-water commercial fisheries are operating within the Pascagoula River drainage basin. The latest

survey, conducted in 1960-61, showed that 14 regular and 75 casual fishermen caught 253,100 pounds of finfish, worth $69,680 (ex-vessel). The two principal groups taken, buffalo and blue/channel catfish, made up approximately 83 percent of the catch by both weight and value. Table 9, furnished by the Mississippi Game and Fish Commission, shows a breakdown of the fisheries by species, gear, and by the two classifications of fishermen.

The marine commercial fisheries of Mississippi are important to the State's economy and are supported by the coastal estuarine environments. In 1964, Mississippi landings approximated 332 million pounds of finfish and shellfish worth more than $8 million (ex-vessel) to the fishermen. Of these, approximately 330 million pounds were estuarine dependent at least during part of their life cycle and valued at over $7.5 million (table 10). The contribution from the Pascagoula estuary to the total catch from estuarine habitat along the Mississippi coast is estimated at approximately one-fourth, valued at about $1.9 million. Changes in estuarine environments through pollution, modification of riverflows, or other factors will affect the survival and economic importance of the marine fisheries.

In November 1965, 48 live bait dealers and 58 live bait commercial fishermen were licensed in the area near the mouth of the Pascagoula River. Although believed to be large and principally composed of mullet and shrimp, both estuarine dependent species, the catch records are not available.

Meeting the Increased Demand (Needs)

Wildlife. The Chickasawhay and Leaf subareas lost population from 1960 to 1965 while the Coastal subarea experienced an increase. Increases throughout the study period are much more pronounced for the Coastal subarea. Increased demand for wildlife resource use will double for the 55 years covered by the study, with better than half this increase occurring in the small four-county Coastal subarea.

In order to analyze demand, capacity, and resource use of basin wildlife, a hypothesis was established assuming resource availability in 1960 equal to demand. An acre man-day value for resource availability was assigned to basin and subarea lands based on 1960 demand. In future years, utilization would be reduced since capacity would be reduced by land-use changes. Table 5 sets forth the results of this analysis and points out the Coastal subarea as the major problem area. In order to satisfy demand, part of the Coastal hunters had

to be shifted to the other two subareas as reflected by resource use versus demand column. Because of growth of population and a small reduction of habitat quality, the demand for hunting will exceed full potential of the wildlife capacity of the Coastal subarea about year 2000.

Table 6 sets forth calculated capacity, demand, increased demand, and the balance of capacity after satisfying demand at target years. We recognize some lands are restricted to hunters, but this factor at the present time does not seriously affect hunter opportunity basinwide.

Capacity basinwide is presently adequate to satisfy basin demand for all periods of the study. However, the lower Coastal area, because of a heavy increase in human population and associated hunter demand, will bring about a pronounced uneven distribution of basin demand to capacity. To satisfy Coastal hunter demand, especially after 1980, it will be necessary and possible to shift part of this pressure to the other two subareas. Increased demand in the Leaf and Chickasawhay subareas can be satisfied within the subareas.

New State management areas or enlargement of existing areas through leasing of private lands will add to hunting opportunity throughout the base area. About 35,000 acres have recently been added to the Bucatunna Wildlife Management Area in Clarke County, and the Mississippi Game and Fish Commission is presently negotiating to add 30,000 acres to the Leaf River area in Perry and Greene Counties. Intensive management of lands presently in public ownership or public and private lands under lease to the Mississippi Game and Fish Commission as tabulated on plate 1 can supply additional hunter opportunity as demand increases. Recent limited establishment of dove shooting fields through food plantings on State management areas and their use by the public indicate additional potential for expanding area hunter opportunity. Private development and leasing of dove shooting fields is already underway in the lower Pascagoula Basin as a means of providing local farmer income and hunting opportunity for sportsmen from such out-of-basin metropolitan centers as Mobile and New Orleans.

Present day capacity for hunter use of the 1,039,574 acres presently available to hunters under public ownership or under lease to the Mississippi Game and Fish Commission is estimated at 0.5 man-days per acre. This figure was established with the aid of Mississippi Game and Fish Commission biologists and considers use for all species

of game available for public hunting. The following set of figures indicates present capacities of these lands and probable future capacities with intensified management.

Year	Public Wildlife Lands (Acres)	Estimated Capacity (Man-Days per Acre)	Total Capacity (Man-Days)
1965	1,039,574	0.5	519,787
2015	1,039,574	1.0	1,039,574

It is apparent that these lands could supply hunter opportunity for about 74 percent of existing demand at present day levels, and with intensive management and protection can supply about the same percent for projected 2015 demand.

Hunter demand cannot be entirely satisfied with public-owned or State-managed lands. Private land holdings will contribute to hunter opportunity, provided their use is of mutual benefit to both the landowner and sportsman. Private sector development involving fee hunting is one aspect capable of providing hunter opportunity for growing population areas such as the Coastal subarea. Similar developments in the other two subareas, especially around the larger metropolitan areas, will insure hunter opportunity for this segment of the population. Dove shooting fields offer the best potential for private sector effort.

Upland game and waterfowl management of suitable future water resource developments in the basin would be necessary to mitigate habitat and hunting opportunity loss associated with reservoir impoundments. These impoundments would inundate some of the basin's best wildlife lands represented by bottom-land hardwoods. Only 10 percent of the basin is presently occupied by this forest type which furnishes about 25 percent of basin hunting capacity. Land-use changes will reduce hardwood bottom lands, and projects considered for construction by all agencies to year 2015 would reduce these lands by about an additional 11 percent. Waterfowl hunting opportunity is low throughout the basin, and water-based projects would supply needed areas for waterfowl development and hunting. Such areas are needed to attract and hold resident wood ducks and migrant ducks.

The following programs would provide basin wildlife supplies and opportunities to satisfy future needs:

1. Continued expansion of wildlife management area program and intensified management as need for hunter opportunity increases.

2. Private sector development where need is apparent, especially in Coastal subarea and near population centers throughout basin. Example: dove shooting fields.

3. A basinwide program of habitat improvement by interested public agencies and the private sector.

4. Leasing of all future water resource development lands not needed for primary project purposes to the Mississippi Game and Fish Commission for wildlife management purposes under an appropriate general plan. If National forest lands are involved, wildlife habitat could be managed under a cooperative arrangement between the U. S. Forest Service and the Mississippi Game and Fish Commission.

Sport Fisheries. Since fishing habits of basin inhabitants are obviously influenced by the available coastal fishing waters, any comparison of basin supply and demand must consider salt-water fishing. It was, therefore, necessary to allocate existing and projected fishing demand between fresh-water and salt-water resources. Such an allocation should weigh the influence of types and location of habitat, availability of existing resources, opportunities for development, and long-range trends in preference. After due consideration of all these factors, the distribution of present and future sport fishing demand within subareas was estimated as follows: Leaf and Chickasawhay, 5 percent salt water and 95 percent fresh water; Coastal, 60 percent salt water and 40 percent fresh water.

When the demand allocated to salt water is compared to supply, there is no doubt that salt-water habitat is adequate to support the estimated demand--now and in target years. In contrast, demand for fresh-water fishing exceeds supply. A comparison of fresh-water demand and estimated supply is shown in table 11. Analysis of this table discloses additional habitat is needed not only to satisfy the increased future demand but also the deficit supply in 1965 in order that all man-days of demand will meet established criteria utilized in determination of supply.

One means of providing additional fresh-water supplies to satisfy existing and future needs is through construction of impoundments. The following guidelines will show how new impoundments can help meet the projected demand for fishing.

	1965	1980	2015
Deficits (man-days)	67,897	248,616	1,327,278
Acres of additional water required			
High-level management	905	3,315	17,697
Low-level management	3,395	12,431	66,343

Waters that could be managed at a high level are impoundments that have a low rate of water exchange, low turbidity, a minimum of shallow bottoms less than 2 feet in depth, and devices for regulating water levels. A general example is a State owned and managed fishing lake. Waters adaptable primarily for low-level management are impoundments having a high rate of water exchange, excessive turbidity, large areas of shallow water, and water-level fluctuation during periods of year favorable to the production of fish. Multiple-purpose reservoirs in the Southeast usually fall in this category mainly because of design and operational requirements.

Commercial Fisheries. The national demand for marine fishery products, especially shrimp and oysters, has greatly exceeded supply. A market for such products will continue to grow based on expanding national and basin populations. Marine fisheries are capable of supporting increased production if estuarine habitats such as the Escatawpa and East Pascagoula estuaries are protected against damage from pollution, construction projects, or major seasonal changes in riverflows. The oyster fishery of the estuaries may be expanded considerably if water quality is improved to permit the opening of areas now closed due to pollution from domestic, industrial, and other sources. The offshore marine catch may be expanded by improved fishing techniques and the expected increased market for species now underutilized through new processing techniques. Table 12 shows the estimated demand for commercial fisheries by 1980 and 2015.

Allocation of Fish and Wildlife Benefits to Proposed Projects

Wildlife. Incidental waterfowl benefits will accrue to projects from increased waterfowl use and associated hunting opportunities. Table 13 sets forth these benefits by 1980 for proposed water acreages. Individual project benefits can be determined by use of the factor given in the table footnote and a monetary value derived by assignment of $3 per man-day.

There will be high value upland game habitat and hunter opportunity loss with land inundated by each reservoir project, as shown in table 13. Much of this loss will involve mixed bottom-land hardwood lands presently supporting high upland game populations. To offset project-induced game habitat losses, suitable project lands, not needed for primary project purposes, should be made available to the Mississippi Game and Fish Commission under an appropriate plan for management.

Fisheries. Projected human populations for the basin will result in an anticipated demand for fresh-water sport fishing that should insure a high degree of proposed project utilization by year 2015. Early action projects planned for completion by 1980 will receive moderate utilization in early project life and high utilization by 2015.

Table 14 sets forth estimated sport fishing use of projects planned for construction by 1980. Allocations were made for 1965, 1980, and 2015 to show anticipated increased use of proposed early action projects based on growing population needs. Tail water fishing benefits are included in fishing use allocations. The footnote at the bottom of table 14 indicates man-day use assigned projects where tail waters were considered significant. Values that could be assigned reservoir and tail water per man-day use are also noted.

The early action reservoir projects proposed by 1980 will satisfy approximately 67 percent of the sport fishing needs anticipated by 2015. Table 15 shows the man-days of fresh-water fishing needs by basin subareas expected by 2015 and the surface acres of multiple-purpose reservoirs required to satisfy these needs. Potential reservoir projects considered by 2015 listed in table 16 would provide almost 40,000 surface acres of additional fishery habitat and would provide a capacity level in excess of the anticipated demand. Since the Benndale project listed in table 16 would conflict with an early action proposal for preservation and retention of Black Creek as a free-flowing stream, it is recommended that the Benndale project be placed in a low priority category for potential consideration. In order to fully satisfy the fishing demand by 2015, single-purpose projects such as State owned and managed fishing lakes should be considered either as a separate alternative solution, or possibly in combination with several of the multiple-purpose projects listed in table 16.

The early action plan proposed to satisfy the diversified fishing and hunting needs in the Pascagoula River Basin is described and summarized as follows:

Fish and Wildlife Plan - Early-Action

The Pascagoula Basin presently contains excellent upland game and sport fisheries habitat and populations. Basin inhabitants have unusual opportunities for resource utilization on private and public lands and in fresh and salt water. Included in the diversified fishery habitat are several excellent float fishing streams only partially developed for access and boat launching. The basin contains many nature areas associated with gulf shore, coastal marsh, upland pine forest, and mixed bottom-land hardwoods.

The Bureau, in cooperation with Federal and State agencies having fish and wildlife resource responsibility in the basin, has developed the following proposals to provide for a high value fish and wildlife resource and associated use opportunity in conjunction with proposed early action projects advanced by the Corps of Engineers, Soil Conservation Service, Pat Harrison Waterways, and the U. S. Forest Service. These proposals are necessarily of a general nature since engineering and reservoir data are not fully developed for individual projects.

The following proposals would establish a diversified fish and wildlife program to satisfy present and future anticipated basin needs:

1. Support of the early action projects proposed by the Corps, SCS, Pat Harrison Waterways, and U. S. Forest Service plans for recreational development. The allocation report section and table 14 describe benefit allocations for fishing to these projects.

2. Proper design of outlet structures in above projects to provide discharge flows of suitable quality and quantity compatible for the maintenance of downstream fishery resources. Fishing benefits were assigned to 6 tail water areas and would be dependent on proper reservoir discharges of quality and quantity.

3. Development of adequate access system for proposed reservoir projects previously designated for recreational purposes. Number of sites and location would be determined during detailed study of the individual projects.

4. All suitable water development project lands not needed for primary project purposes be made available to the State game and fish agencies for wildlife-management purposes. As mitigation to compensate for project-induced wildlife losses, sufficient total land area should be acquired and placed under intensive management to compensate for the approximate 30,000 man-days of upland game hunting loss resulting from construction of impoundments. Wildlife studies during individual project analysis would be required to designate specific areas having the best potential for upland game management and waterfowl resting and shooting areas.

5. Protection of valuable estuarine habitat areas and also inland stream reaches in the basin through pollution control and of the operation of reservoir projects proposed for construction to prevent adverse changes in river discharge. Emphasis should be placed on possible improvement of shrimp and oyster habitat since these two species are of great importance to the basin and State economy. Coordination of detailed studies on those projects having major effects with the Federal Water Pollution Control Administration, Bureau of Commercial Fisheries, Public Health Service, and the State of Mississippi.

6. Establishment of a refuge for the preservation and possible increase of a remnant flock of the Florida sandhill crane (*Grus canadensis pratensis*). This sandhill crane is recognized as a rare and localized species by the Committee on Rare and Endangered Wildlife Species, Bureau of Sport Fisheries and Wildlife, U. S. Department of the Interior. The total present estimated number in the United States is only 2,000-3,000 birds--about 50 of which constitutes the Mississippi flock. There is a possibility that the Mississippi colony represents a distinct race. At present, the home range is now restricted to Okefenokee Swamp, Georgia, several areas in peninsular Florida, and two areas in Jackson County, Mississippi. The proposed refuge would involve acquisition of approximately 9,800 acres with a general location northeast of Ocean Springs, Mississippi, and northwest of Pascagoula, Mississippi. Management of the area would consist of preservation and habitat improvement of the open savannah habitat, "type 8 wetlands." Primary purposes involved would be scientific

study and recreation, bird watching, and wildlife photography. Proposals for administration would involve the Bureau of Sport Fisheries and Wildlife or possibly a coordinated effort by Federal, State, and private conservation organizations.

7. Preservation of Black Creek as a free-flowing float fishing stream, and continued development of Black-Beaver Dam Creeks within U. S. Forest Service lands in accordance with their plans for recreational purposes. These plans provide for a total of 1,830 acres of land and water including approximately 50 miles of float fishing stream and total development of 9 boat access sites. Possible extension of the float fishing stream beyond Forest Service proposals may be considered as a plan of development by the Mississippi Game and Fish Commission.

8. (a) Preservation of Red Creek as a free-flowing fishing stream involving a considered plan of development by Mississippi Game and Fish Commission to provide 7 boat access sites at highway crossings along 50 miles of stream.

   (b) Preservation of Chunky River as a free-flowing fishing stream involving a considered plan of development by Mississippi Game and Fish Commission to provide 4 boat access sites at road crossings along approximately 25 miles of stream.

9. Acquisition or lease of approximately 30,000 acres of wildlife habitat for addition to present basin wildlife management program as contemplated by the Mississippi Game and Fish Commission to provide additional public hunting opportunity.

10. Accelerated wildlife management program on existing State wildlife management areas and National forest lands as the need for public hunting demand increases. Dove shooting fields are an example.

11. Encouragement of the public agencies and the private sector to carry out a basinwide wildlife habitat improvement program. Private sector development in the Coastal subarea is especially needed. Dove shooting fields are

an example. Farm ponds play an important role in supplying fishing opportunity, and the private sector has the opportunity to develop existing ponds as well as build new ones.

12. Coordination of detailed project proposals for individual projects concerning fishery and wildlife management with the Mississippi Game and Fish Commission, the Alabama Department of Conservation, and other involved agencies.

This report has been reviewed and concurred in by the Bureau of Commercial Fisheries, Mississippi Game and Fish Commission, and the Alabama Department of Conservation. Copies of comments from the State agencies are attached.

Please be assured of our continuing cooperation in formulating a plan that will properly provide for the present and projected needs of the Pascagoula Basin.

Sincerely yours,

Walter A. Gresh

Walter A. Gresh
Regional Director

Attachments 22

TABLE 1

PRESENT AND PROJECTED SPORT HUNTING AND FISHING DEMAND*

PASCAGOULA BASIN

Area	Population-12 yrs.& older			M/D Fishing Demand			M/D Hunting Demand		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
LEAF SUBAREA									
1960	52,008	78,568	130,576	210,112	385,769	595,881	59,289	206,634	265,923
1965	56,018	76,382	132,400	226,313	375,036	601,349	63,861	200,885	264,746
1980	72,827	73,973	146,800	294,221	363,207	657,428	83,023	194,549	277,572
2015	166,532	82,768	249,300	672,789	406,391	1,079,180	189,846	217,680	407,526
CHICKASAWHAY SUBAREA									
1960	41,112	51,944	93,056	166,092	255,045	421,137	46,868	136,613	183,481
1965	44,698	50,002	94,700	180,580	245,510	426,090	50,956	131,505	182,461
1980	52,053	47,247	99,300	210,294	231,983	442,277	59,340	124,260	183,600
2015	87,470	62,230	149,700	353,379	305,549	658,928	99,716	163,665	263,381
COASTAL SUBAREA									
1960	89,874	47,318	137,192	363,091	232,331	595,422	102,456	124,446	226,902
1965	109,440	50,560	160,000	442,138	248,250	690,388	124,762	132,973	257,735
1980	170,053	57,747	227,800	658,014	283,538	970,552	193,860	151,875	345,735
2015	403,603	105,997	509,600	1,630,556	520,445	2,151,001	460,107	278,772	738,879
PASCAGOULA BASIN									
1960	182,994	177,830	360,824	739,295	873,145	1,612,440	208,613	467,693	676,306
1965	210,156	176,944	387,100	849,031	868,796	1,717,827	239,579	465,363	704,942
1980	294,933	178,967	473,900	1,162,529	878,728	2,041,257	336,223	470,684	806,907
2015	657,605	250,995	908,600	2,656,724	1,232,385	3,889,109	749,669	660,117	1,409,786

Man-Days Fishing Demand per capita 12 years and older

Urban - 4.04 annually
Rural - 4.91 annually

Man-Days Hunting Demand per capita 12 years and older

Urban - 1.14 annually
Rural - 2.63 annually

*Represents total sport fishing demand for fresh-water and salt-water resources.

TABLE 2

DATA FOR EVALUATION OF POTENTIAL WILDLIFE RESOURCES CAPACITY

Species	Wildlife Density per 1,000 Acres							Sustained Annual Yield % of Population	Man-Days per Kill
	Cropland	Forest			Pasture	Federal non Forest[4]	Other[5]		
		Type 2[1]	Type 8[2]	Type 13[3]					
Rabbit	330	130	140	250	250	250	200	70%	.83
Quail	250	50	50	50	130	130	130	60%	.66
Squirrel	-	100	130	330	-	-	20	60%	.66
Dove	130	-	-	-	70	70	70	50%	.40
Deer	-	20	20	30	-	-	-	30%	25.00
Turkey	-	5	7	12	-	-	-	50%	25.00
Raccoon	-	7	10	50	-	-	-	50%	2.00
Fox	-	7	10	13	-	-	-	60%	2.50

1. Longleaf-slash
2. Shortleaf-loblolly-hardwoods
3. Mixed bottomland hardwoods
4. Government lands not in National Forest
5. House lots, barn lots, lanes, roads, ditches, land area of ponds, and wastelands

TABLE 3

POTENTIAL MAN-DAY HUNTING CAPACITY PER ACRE

Species	Cropland	Forest - Farm & Non-Farm			Pasture	Federal non Forest[4]	Other[5]	Urban	Water[6]
		Type 2[1]	Type 8[2]	Type 13[3]					
Rabbit	.19	.08	.08	.15	.15	.15	.12	-	-
Quail	.10	.02	.02	.02	.05	.05	.05	-	-
Squirrel	-	.04	.05	.13	-	-	.01	-	-
Dove	.03	-	-	-	.01	.01	.01	-	-
Deer	-	.15	.15	.23	-	-	-	-	-
Turkey	-	.06	.09	.15	-	-	-	-	-
Raccoon	-	.01	.01	.05	-	-	-	-	-
Fox	-	.01	.01	.02	-	-	-	-	-
Capacity M/D per Acre	.32	.37	.41	.75	.21	.21	.19	-	-

1. Longleaf-slash
2. Shortleaf-loblolly hardwoods
3. Mixed bottomland hardwoods
4. Government lands not in National Forest
5. House lots, barn lots, lanes, roads, ditches, land area of ponds, and wastelands
6. Water areas less than 40 acres and streams less than one-eighth mile wide

TABLE 4

PRESENT AND PROJECTED LAND USE*
(In Acres)

Area	Cropland	Forest - Farm & Non-Farm			Pasture	Federal non-Forest[4]	Other[5]	Urban	Water[6]	Totals
		Type 2[1]	Type 8[2]	Type 13[3]						
LEAF										
1960	337,807	529,144	1,133,884	226,776	162,757	5,000	34,332	75,500	15,200	2,520,400
1980	312,100	535,360	1,147,200	229,440	152,500	5,000	30,000	93,600	15,200	2,520,400
2015	270,700	532,196	1,140,420	228,084	147,300	5,000	22,500	159,000	15,200	2,520,400
CHICKASAWHAY										
1960	221,687	312,812	1,324,879	202,408	144,125	35,100	20,589	61,900	6,000	2,329,500
1980	190,700	317,254	1,343,664	205,282	152,500	35,100	15,300	63,700	6,000	2,329,500
2015	155,000	319,175	1,351,800	206,525	147,200	35,100	11,500	97,200	6,000	2,329,500
COASTAL										
1960	89,306	845,437	223,758	174,061	17,815	-	12,823	94,200	16,000	1,473,400
1980	87,200	806,956	213,606	166,138	16,000	-	14,700	152,800	16,000	1,473,400
2015	74,300	693,124	183,474	142,702	15,500	-	11,000	337,300	16,000	1,473,400
BASIN										
1960	648,800	1,687,393	2,682,521	603,245	324,697	40,100	67,744	231,600	37,200	6,323,300
1980	590,000	1,659,570	2,704,470	600,860	321,000	40,100	60,000	310,100	37,200	6,323,300
2015	500,000	1,544,495	2,675,694	577,311	310,000	40,100	45,000	593,500	37,200	6,323,300

* Land-use data provided by the U. S. Department of Agriculture.

1 Longleaf-slash
2 Shortleaf-loblolly-hardwoods
3 Mixed bottomland hardwoods
4 Government lands not in National Forest
5 House lots, barn lots, lanes, roads, ditches, land area of ponds, and wastelands
6 Water areas less than 40 acres and streams less than one-eighth mile wide

TABLE 5

HUNTING NEEDS ASSOCIATED WITH DEMAND, CAPACITY, AND AVAILABLE SUPPLY

Areas	Hunting - Man-Day Estimates			Resource Use vs. Demand Status
	Demand	Capacity[1]	Hunter Utilization[2] 1960 Level	
LEAF				
1960	265,923	980,607	270,230	+ 4,307
1965	264,746	980,605	270,230	+ 5,484
1980	277,572	979,162	269,301	- 8,271
2015	407,526	958,430	263,014	- 144,512
CHICKASAWHAY				
1960	183,481	923,236	250,994	+ 67,513
1965	182,461	923,224	250,994	+ 68,533
1980	183,600	925,575	240,983	+ 57,383
2015	263,381	917,295	248,415	- 14,966
COASTAL				
1960	226,902	569,854	154,915	- 71,987
1965	257,735	569,868	154,915	- 102,820
1980	345,735	544,813	148,143	- 197,592
2015	738,879	467,828	127,109	- 611,770
BASIN				
1960	676,306	2,473,697	676,139	- 167
1965	704,942	2,473,697	676,139	- 28,803
1980	806,907	2,449,550	658,427	- 148,480
2015	1,409,786	2,343,553	638,538	- 771,248

[1]Without regard to limitations such as conflicting land uses, posting, accessibility, or distribution of hunters to utilize resources.

[2]Reflects that portion of capacity considered available to hunters in 1960; land-use changes determine this figure for target years.

TABLE 6

HUNTING NEEDS ASSOCIATED WITH CAPACITY AND DEMAND

Areas	Hunting - Man-Day Estimates			
	Capacity*	Demand	Increased Demand (Needs)	Reserve Capacity*
LEAF				
1960	980,607	265,923	-	714,684
1965	980,605	264,746	-	715,859
1980	979,162	277,572	12,826	701,590
2015	958,430	407,526	129,954	550,904
CHICKASAWHAY				
1960	923,236	183,481	-	739,755
1965	923,224	182,461	-	740,763
1980	925,575	183,600	1,139	741,975
2015	917,295	263,381	79,781	653,914
COASTAL				
1960	569,854	226,902	-	342,952
1965	569,868	257,735	30,829	312,133
1980	544,813	345,735	88,000	199,078
2015	467,828	738,879	393,144	- 271,051
BASIN				
1960	2,473,697	676,306	-	1,797,391
1965	2,473,697	704,942	-	1,768,755
1980	2,449,550	806,907	101,965	1,642,643
2015	2,343,553	1,409,786	602,879	933,767

*Without regard to limitations such as conflicting land uses, posting, accessibility, or distribution of hunters to utilize resources.

TABLE 7

PASCAGOULA BASIN FRESHWATER HABITAT AND ASSOCIATED MAN-DAYS FISHING CAPACITY - 1960

Area	*Farm impound-ments	Natural lakes	Public Fishing Lakes		Streams				Totals
			State	Federal	Main stem	Major tribs.	Inter-mediate tribs.	Small tribs.	
LEAF									
Acres of Habitat	5,955[1]	2,080[2]	1,851[3]	81[1]	3,055[1]	3,073[1]	1,005[4]	220	17,320
M/D Fishing Capacity	119,100	62,400	92,550	1,620	61,100	61,460	3,015	-	401,245
CHICKASAWHAY									
Acres of Habitat	2,946[1]	1,840[2]	300[3]	-	2,965[1]	2,195[1]	2,345[4]	352	12,943
M/D Fishing Capacity	58,920	55,200	15,000	-	59,300	43,900	7,035	-	239,355
COASTAL									
Acres of Habitat	1,024[1]	3,700[2]	-	6[1]	7,469[2]	1,317[2]	1,675[5]	99[6]	15,290
M/D Fishing Capacity	20,480	111,000	-	120	224,070	39,510	16,750	495	412,425
BASIN									
Acres of Habitat	9,925	7,620	2,151	87	13,489	6,585	5,025	671	45,553
M/D Fishing Capacity	198,500	228,600	107,550	1,740	344,470	144,870	26,800	495	1,053,025

* Includes both managed and unmanaged areas

[1] 20 man-days per acre
[2] 30 man-days per acre
[3] 50 man-days per acre
[4] 3 man-days per acre
[5] 10 man-days per acre
[6] 5 man-days per acre

Note: Back Bay of Biloxi, St. Louis Bay, and waters south of Highway U. S. 90 were excluded from inventory.

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TABLE 8

PASCAGOULA BASIN FRESH-WATER AREA CATEGORIES AND ASSOCIATED MAN-DAYS FISHING CAPACITY - 1965

Area	Reser-voirs	Farm impound-ments	Natural lakes	Public Fishing Lakes		Streams				Totals
				State	Federal	Main stem	Major tribs.	Inter-mediate tribs.	Small tribs.	
LEAF										
Acres of Habitat	-	7,770[1]	2,080[2]	1,851[3]	181[1]	3,055[1]	3,073[1]	1,005[4]	229	19,244
M/D Fishing Capacity	-	155,400	62,400	92,550	3,620	61,100	61,460	3,015	-	439,545
CHICKASAWHAY										
Acres of Habitat	3,800[1]	3,592[1]	1,840[2]	300[3]	-	2,965[1]	2,096[1]	2,345[4]	352	17,290

TABLE 9

PASCAGOULA RIVER WATERSHED COMMERCIAL FISHERY - 1960-61
TOTAL POUNDS OF COMMERCIAL SPECIES BY GEAR AND TOTAL
VALUE BY SPECIES FOR REGULAR AND CASUAL FISHERMEN

	Gill	Hoop	Trot	Total	Value
Regular Fishermen (14)*					
Buffalo	7,000	115,800	-	122,800	$30,000
Carp	200	4,300	-	4,500	900
Drum	500	5,800	-	6,300	1,200
Quillback					
Bullhead Catfish					
Blue/Channel Catfish	1,000	25,500	5,900	32,400	12,960
Flathead Catfish	1,000	7,300	1,850	10,150	4,060
Paddlefish	1,100	8,750	-	9,850	1,900
Sturgeon	200	1,200	-	1,400	250
Subtotal	11,000	168,650	7,750	187,400	$51,270
Casual Fishermen (75)*					
Buffalo	10,000	32,600	-	42,600	$10,600
Carp	200	1,500	-	1,700	300
Drum	500	1,500	-	2,000	400
Quillback					
Bullhead Catfish			100	100	30
Blue/Channel Catfish	[illegible]	7,000	4,700	13,700	5,480
Flathead Catfish	[illegible]	1,350	600	2,450	980
Paddlefish	1,000	1,550	-	2,550	500
Sturgeon	200	400	-	600	120
Subtotal	14,400	45,900	5,400	65,700	$18,410
TOTAL	25,400	214,550	13,150	253,100	$69,680

*Number of Fishermen

TABLE 10

MARINE COMMERCIAL FISHERIES

MISSISSIPPI LANDINGS - 1964

Total Pounds and Value

Major Species	Pounds	Value
*Drum, Red	50,000	$ 7,000
*Flounder	57,000	8,000
*King Whiting	323,000	20,000
*Menhaden	237,833,000	3,131,000
*Mullet	250,000	12,000
*Sea Trout, Spotted	148,000	31,000
*Unclassified[1] (bait, reduction, animal food)	78,425,000	1,349,000
Groupers	268,000	29,000
Red Snapper	1,849,000	461,000
*Blue Crab	1,298,000	82,000
*Oysters	4,829,000	1,099,000
*Shrimp	6,416,000	1,805,000
TOTAL	331,746,000	$ 8,034,000

*Estuarine dependent species primarily.

[1]Comprised of over 170 species, many of which are presently under-utilized.

TABLE 11

PASCAGOULA BASIN - FRESH-WATER FISHING DEMAND AND CAPACITIES WITHOUT ADDITIONAL HABITAT

Area	Base Year 1960	Existing or Under Construction 1965	1980	2015
LEAF				
M/D Fishing Demand	566,087	571,282	624,557	1,025,221
M/D Fishing Capacity	401,245	439,545	439,545	439,545
Needs*	164,842	131,737	185,012	585,676
CHICKASAWHAY				
M/D Fishing Demand	400,080	404,785	420,163	625,982
M/D Fishing Capacity	239,355	326,295	326,295	326,295
Needs*	160,725	78,490	93,868	299,687
COASTAL				
M/D Fishing Demand	238,169	276,155	388,221	860,400
M/D Fishing Capacity	412,425	418,485	418,485	418,485
Needs*	- 174,256[1]	- 142,330[1]	- 30,264[1]	441,915
BASIN				
M/D Fishing Demand	1,204,336	1,252,222	1,432,941	2,511,603
M/D Fishing Capacity	1,053,025	1,184,325	1,184,325	1,184,325
Needs*	151,311	67,897	248,616	1,327,278

*Unsatisfied Demand.

[1]M/D Fishing Capacity exceeds Demand for this year.

TABLE 12

PROJECTED COMMERCIAL FISHERY DEMAND[1]

Fresh Water
(Thousands of Pounds)

1964	1980	2015
253	363	512

Marine - Estuarine
(Thousands of Pounds)

1964	1980	2015
329,619	420,535	648,475

Marine - Offshore
(Thousands of Pounds)

1964	1980	2015
2,117	7,210	17,365

[1] Projections based on data provided by BCF, St. Petersburg, Florida.

TABLE 13

PASCAGOULA BASIN

SUMMARY OF PROPOSED EARLY-ACTION PROJECT EFFECTS ON WILDLIFE - 1980

Agency	Average Summer Pool Area (acres)	Upland Game Hunting Loss* Man-Days[1]	Waterfowl Hunting Man-Days Increase[2]	Waterfowl Hunting Man-Days Value
Corps of Engineers	31,000	23,250	3,100	$ 9,300
Pat Harrison Waterways	6,102	4,576	610	1,830
SCS - Small Watersheds	3,960	2,970	396	1,188
National Forest Lakes	2,029	1,522	203	609
Private sector lakes and ponds	1,634	1,226	163	489
Totals	44,725	33,544	4,472	$13,416

*Loss considered mainly bottomland hardwood habitat

1. Factor .75 M/D per acre
2. Factor .10 M/D per acre

TABLE 14

PASCAGOULA BASIN

PROPOSED WATER DEVELOPMENTS FOR OPERATION OR AUTHORIZATION BY 1980

Projects	Planning Agency	Average Summer Pool (acres)	M/D Fishing Use Allocation* (1.5) 1965	(5.5) 1980	(20) 2015[1]
LEAF SUBAREA					
Taylorsville	CE	3,500	5,250	19,250	70,000
Tallahala	CE	4,400	6,600	24,200	88,000
Bowie	CE	5,500	8,250	30,250	110,000
Mize	CE	3,600	5,400	19,800	72,000
Thompson Creek	PHW	4,100	6,150	22,550	82,000
Little Black Creek	PHW	400	600	2,200	8,000
West Tiger Creek	PHW	217	325	1,193	4,340
Big Creek (Site 6)	SCS	250	375	1,375	5,000
Big Creek (Site 8-A)	SCS	110	165	605	2,200
Upper Leaf	SCS	250	375	1,375	5,000
West Bowie	SCS	100	150	550	2,000
Upper Bowie	SCS	100	150	550	2,000
Dry Creek	SCS	150	225	825	3,000
Okatoma Creek	SCS	250	375	1,375	5,000
Okatoma (Blackley)	SCS	300	450	1,650	6,000
Oakohay	SCS	150	225	825	3,000
Oakey Woods (Station Creek)	SCS	150	225	825	3,000
Tallahoma	SCS	300	450	1,650	6,000
Bogue Homa	SCS	200	300	1,100	4,000
Souinlovey (Penantly)	SCS	250	375	1,375	5,000
National Forest Lakes	FS	995	1,493	5,473	19,900
Private sector	P	311	467	1,711	6,220
		25,583	38,375	140,707	511,660
CHICKASAWHAY SUBAREA					
Kittrell Creek	PHW	329	493	1,809	6,580
Whetstone Creek	PHW	256	384	1,408	5,120
Archusa Creek	PHW	400	600	2,200	8,000
Chunky-Okahatta (Site 13)	SCS	400	600	2,200	8,000
Chunky-Okahatta (Site 1)	SCS	150	225	825	3,000
Sowashee	SCS	100	150	550	2,000
West Tallahala	SCS	150	225	825	3,000
Upper Tallahala	SCS	100	150	550	2,000
Okatibbee (Penders)	SCS	250	375	1,375	5,000
Bucatunna (East)	SCS	250	375	1,375	5,000
National Forest Lakes	FS	144	216	792	2,880
Private sector	P	1,221	1,832	6,716	24,420
		3,750	5,625	20,625	75,000

TABLE 14 (Con.)

PASCAGOULA BASIN

PROPOSED WATER DEVELOPMENTS FOR OPERATION OR AUTHORIZATION BY 1980

Projects	Planning Agency	Average Summer Pool (acres)	M/D Fishing Use Allocation*		
			(1.5) 1965	(5.5) 1980	(20) 2015[1]
COASTAL SUBAREA					
Harleston	CE	14,000	21,000	77,000	280,000
Big Creek	PHW	400	600	2,200	8,000
National Forest Lakes	FS	890	1,335	4,895	17,800
Private sector	P	102	153	561	2,040
		15,392	23,088	84,656	307,840
BASIN					
Corps of Engineers Projects		31,000	46,500	170,500	620,000
Pat Harrison Waterways		6,102	9,152	33,560	122,040
SCS Small Watersheds		3,960	5,940	21,780	79,200
National Forest Lakes		2,029	3,044	11,160	40,580
Private sector		1,634	2,452	8,988	32,680
		44,725	67,088	245,988	894,500

*Includes tailwater fishing benefits as follows:

Harleston - 5,000 man-days
Taylorsville - 2,000 man-days
Tallahala - 5,000 man-days
Bowie - 4,000 man-days
Mize - 2,000 man-days
Thompson Creek - 2,000 man-days

Reservoir fishing valued at $1.00 and tailwater at $1.25 per man-day.

[1] Represents man-day use per acre per year. Use by 2015 has reached capacity level for satisifying demands.

TABLE 15

ESTIMATED MAN-DAYS OF FRESH-WATER FISHING NEEDED
AND ACRES OF WATER DEVELOPMENTS REQUIRED BY 2015

Location	Man-Day Needs[1]	Water Acres Required
Leaf Subarea	74,016	3,700
Chickasawhay Subarea	224,687	11,200
Coastal Subarea	134,075	6,700
Basin Total	432,778	21,600

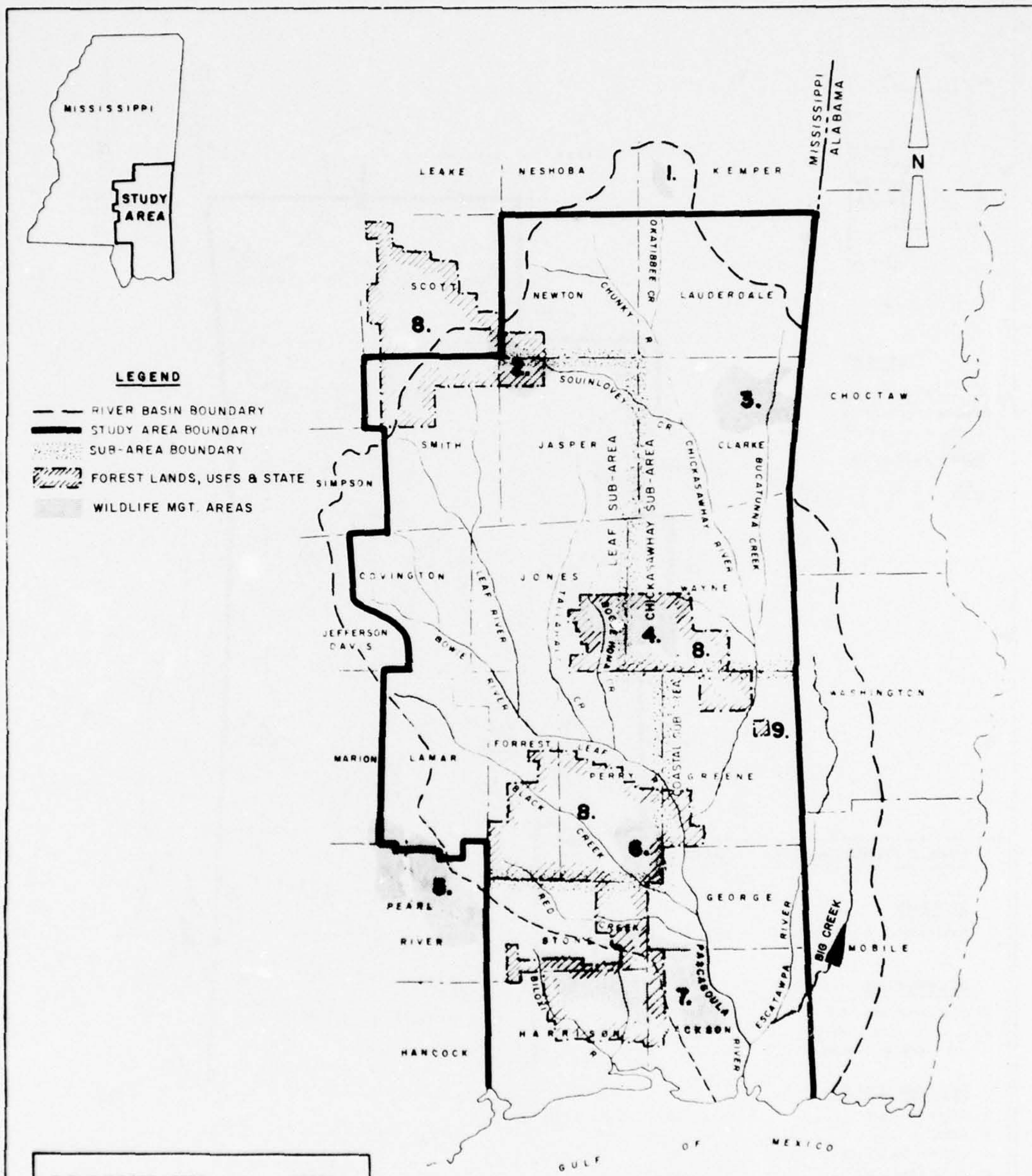
[1]Represents the unsatisfied demand not met by the 1980 project proposals. (See tables 11 and 14.)

TABLE 16

PASCAGOULA BASIN

POTENTIAL WATER DEVELOPMENTS FOR CONSIDERATION BY 2015

Projects	Planning Agency	Average Summer Pool (acres)
LEAF SUBAREA		
Moss	CE	1,300
Lower Tallahala	SCS	400
Upper Black Creek	SCS	500
Lower Bogue Homo	SCS	500
National Forest Lakes	FS	1,716
Private sector	P	1,212
		5,628
CHICKASAWHAY SUBAREA		
Leakesville	CE	1,400
Bucatunna	CE	3,800
Manasse	CE	2,500
Waynesboro	CE	7,000
Graham	CE	640
Tallasher	CE	1,100
Long Creek	SCS	300
Upper Chickasawhay	SCS	300
Five Mile Creek	SCS	300
Shubuta	SCS	400
Yellow Creek	SCS	400
Gaines Creek	SCS	500
Upper Escatawpa (Ala.)	SCS	400
National Forest Lakes	FS	510
Private sector	P	4,187
		23,737
COASTAL SUBAREA		
Upper Escatawpa	CE	2,900
Vancleave	CE	360
Perkinston	CE	1,900
Benndale	CE	2,600
National Forest Lakes	FS	2,216
Private sector	P	632
		10,608
BASIN		
Corps of Engineers Projects		25,500
Pat Harrison Waterways		-
SCS Small Watersheds		4,000
National Forest Lakes		4,442
Private sector		6,031
		39,973



PUBLIC HUNTING LANDS	ACRES
1. Okatibbee W.M.A.	3,300
2. Tallahala W.M.A.	30,000
3. Bucatunna W.M.A.	100,000
4. Chickasawhay W.M.A.	120,000
5. Wolf River W.M.A.	30,000
6. Leaf River W.M.A.	42,000
7. Red Creek W.M.A.	340,000
8. Desoto and Bienville N.F. Units outside W.M.A's	372,514
9. Kurtz State Forest not in W.M.A. Program	1,760
	1,039,574

PASCAGOULA BASIN

MISSISSIPPI AND ALABAMA

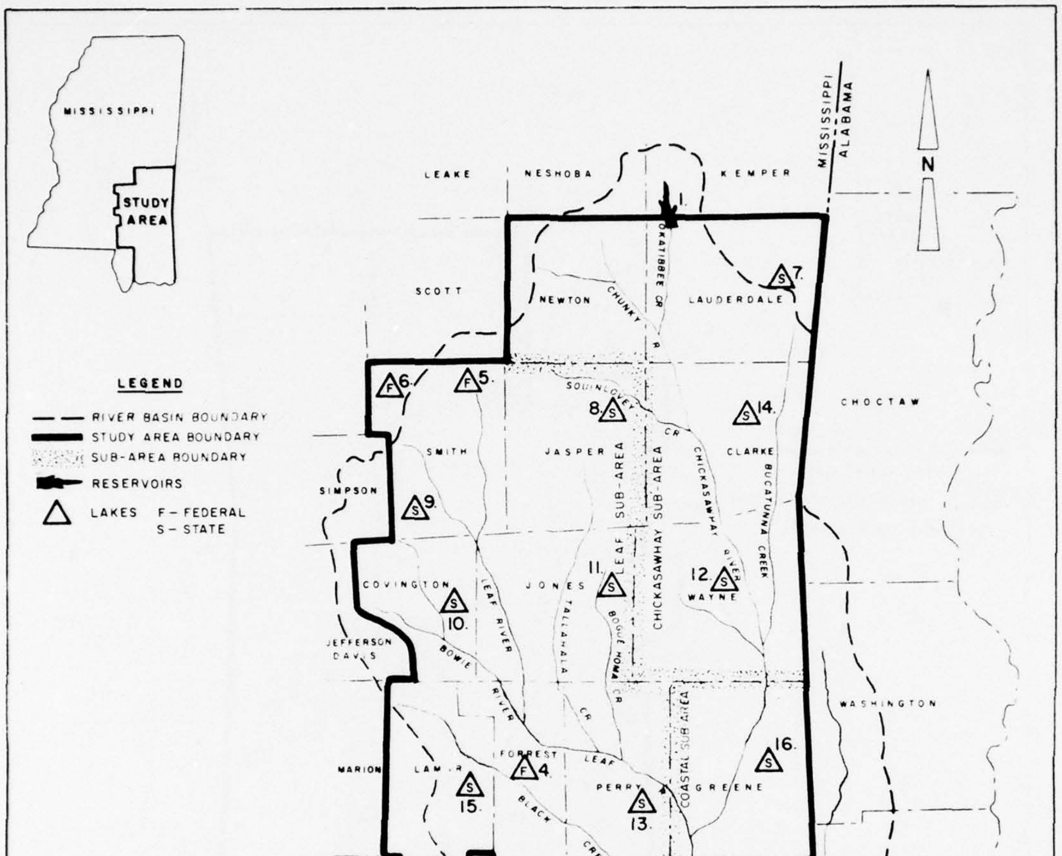
PUBLIC HUNTING LANDS

0 10 20 30 Miles

SCALE

UNITED STATES DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Bureau of Sport Fisheries and Wildlife

PLATE 1



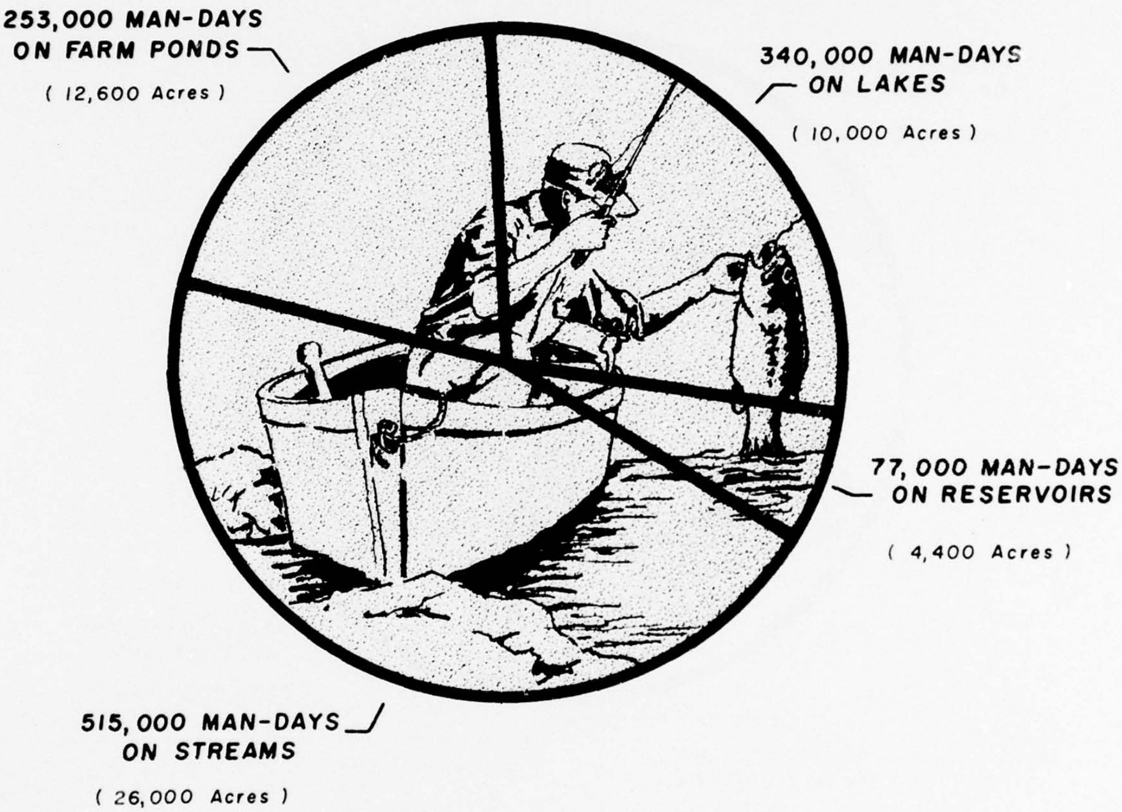
PUBLIC FISHING WATER	ACRES
STREAMS	
PASCAGOULA R and TRIBS.	25,667
RESERVOIRS	
1 OKATIBBEE RES. – C.E.	3,800
2 FLINT CR. RES. – P.H.W.	600
3. BIG CREEK RES. – M.W.W.B.	
FEDERAL LAKES	
3 AIREY L. – N.F.	6
4 ASHE L. – N.F.	11
5 MARATHON L. – N.F.	70
6 DUCK POND – N.F.	100
STATE LAKES	
7 L. TOM BAILEY – M.G.& F.	234
8 L. CLAUDE BENNETT – M.G.& F.	71
9 L. ROSS BARNETT – M.G.& F.	87
10 L. MIKE CONNER – M.G.& F.	88
11 BOGUE HOMA – M.G.& F.	1,200
12 LAKELAND PARK – M.G.& F.	12
13 L. PERRY – M.G.& F.	125
14 L. CLARKE – M.P.S.	50
15 L. PAUL JOHNSON – M.P.S.	280
16 KURTZ STATE FOREST L. – M.F.C.	4
	32,405

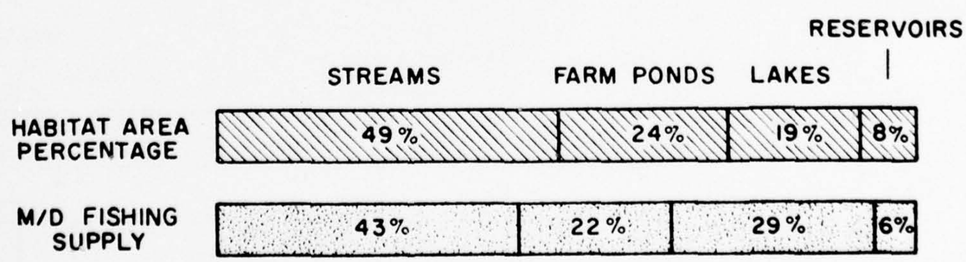
PASCAGOULA BASIN
MISSISSIPPI AND ALABAMA
PUBLIC FISHING WATER

0 10 20 30 Miles
SCALE

UNITED STATES DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Bureau of Sport Fisheries and Wildlife

PRESENT MAN-DAY FISHING SUPPLY *
PASCAGOULA RIVER BASIN, MISS. & ALA.





*Fresh-water

PLATE 3

PRESENT MAN-DAY HUNTING SUPPLY
PASCAGOULA RIVER BASIN, MISS. & ALA.

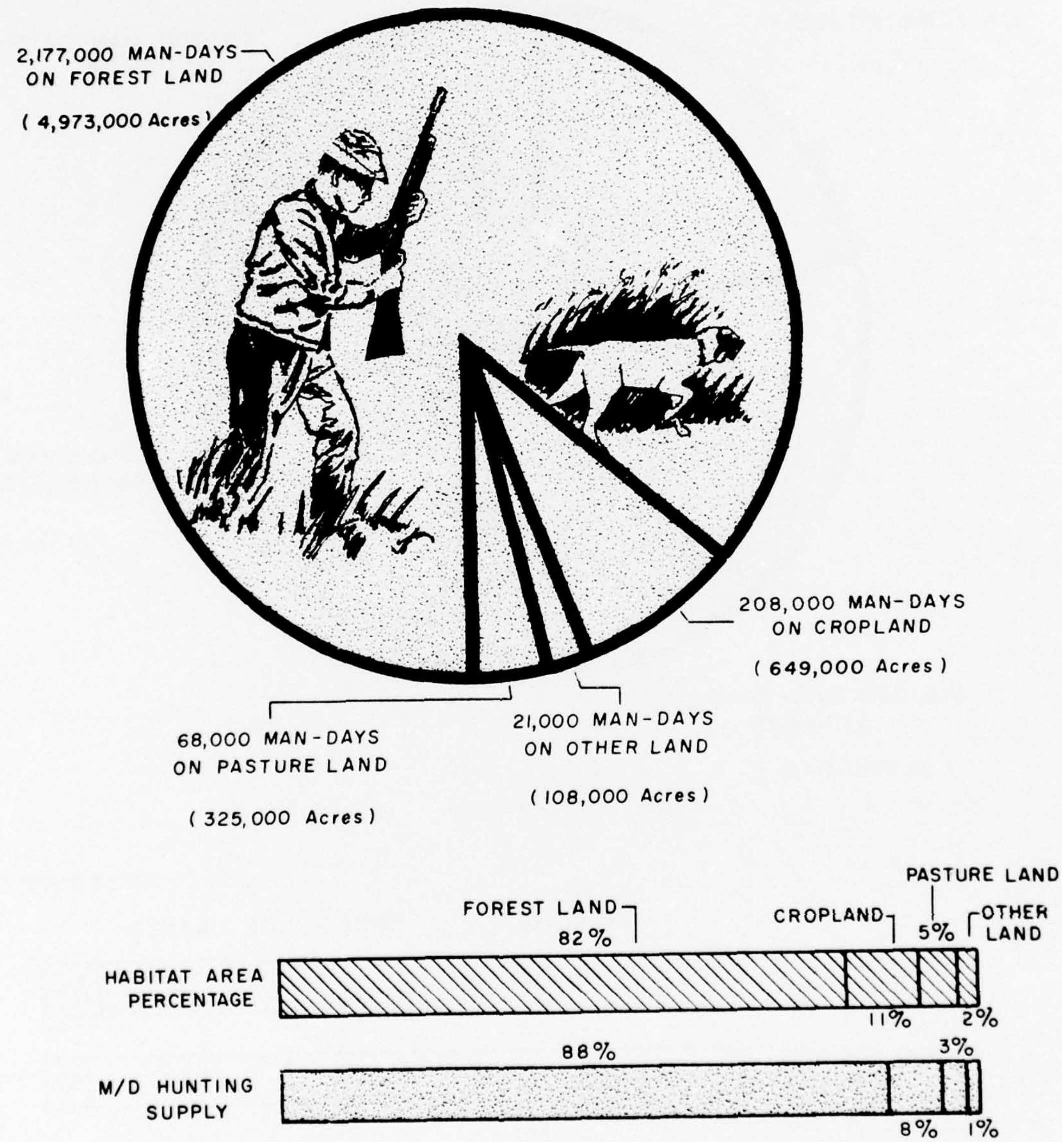


PLATE 4

Game & Fish Commission

STATE OF MISSISSIPPI

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GOVERNOR

COMMISSIONERS

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EDWARDS

TOM RIDDELL, JR., VICE CHAIRMAN
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DR. I. W. BUSH
NORTH CARROLLTON

STEVE T. MISTILIS
OXFORD

December 8, 1966

Mr. Walter A. Gresh, Regional Director
Bureau of Sport Fisheries and Wildlife
Peachtree-Seventh Building
Atlanta, Georgia 30323

Dear Mr. Gresh:

Reference is made to Mr. W. L. Towns' letter of December 2, 1966 with attached copy of your Pascagoula River Basin report containing an early action fish and wildlife plan. We have previously concurred in this preliminary report.

The revised early action fish and wildlife plan makes reference to the importance of adequate access for the proposed reservoir projects for recreational purposes. We interpret this to include the acquisition of land and water areas for recreational use by the public. We recommend early action by the sponsoring agency to delineate fee title acquisition boundaries of reservoir project land and water areas. Fish and wildlife development planning can then be effectively done before construction. In the event flowage easements only are acquired on portions of the reservoirs, we suggest that public recreation and water quality control easements also be obtained by the sponsoring agency up to the maximum pool elevations.

Very truly yours,

Billy Joe Cross

Billy Joe Cross
Executive Director

BJC:pd

STATE OF ALABAMA
DEPARTMENT OF CONSERVATION
ADMINISTRATIVE BUILDING
MONTGOMERY, ALABAMA 36104

CLAUDE D. KELLEY
DIRECTOR

RICHARD T. TURNER
ASSISTANT DIRECTOR

December 19, 1966

Mr. W. L. Towns
Acting Regional Director
U.S. Fish and Wildlife Service
Bureau of Sport Fisheries and
Wildlife
Peachtree-Seventh Building
Atlanta, Georgia 30323

Dear Mr. Towns:

We have reviewed your Department's report on the Pascagoula River Basin. I would suggest the following to make this report more meaningful.

1. Expand Plate 1 (map of Pascagoula Basin) to show that section of the Basin in Alabama.

2. That the first paragraph of the report be reworded. As written, it now appears that the Mississippi Game and Fish Commission investigated the fish and wildlife resources of both Mississippi and Alabama.

With these alterations, our Department concurs in the report.

Sincerely yours,

Claude D. Kelley
Director

PASCAGOULA RIVER COMPREHENSIVE BASIN STUDY

APPENDIX J

APPRAISAL OF ARCHEOLOGICAL AND HISTORICAL RESOURCES OF THE PASCAGOULA RIVER BASIN

Prepared by the National Park Service,
Department of the Interior, as a contribution to the
Pascagoula River Comprehensive Basin Study

CONTENTS

APPRAISAL OF ARCHEOLOGICAL AND HISTORICAL RESOURCES OF THE PASCAGOULA RIVER BASIN

INTRODUCTION

The basic information for the appraisal of the Pascagoula River Basin was secured by the National Park Service through a cooperative agreement with the State of Mississippi Department of History and Archives. Chief Curator Robert S. Neitzel of that institution accomplished the field investigation, secondary source review and much of the report compilation in a limited time because of the acceleration of reporting deadlines.

The following report briefly describes the natural features of the area and summarizes the general history of non-Indian settlement. An evaluation of the archeological resources as presently known or recognized is attempted. It appears that there are no archeological sites or data available or known that would interfere with or be vitiated by the development or use of the resources of the Pascagoula River Basin.

I. The Natural Features

The Basin

The Pascagoula River and its principal tributaries, the Leaf and Chickasawhay Rivers, drain all or part of three Alabama counties and twenty-two Mississippi counties which comprise approximately the southeastern one-fourth of the State of Mississippi and a small portion of southwestern Alabama. The two tributaries begin in the northwest and northeast parts of this area, respectively, and flow south through the Southern Pine Hills, to join in northern George County and form the Pascagoula River. The latter continues to meander another forty to fifty miles through the Longleaf pine rolling country and a narrow strip of Coastal Pine Meadows to emerge into the Gulf of Mexico.

The general drainage area is bounded on the north by a portion of the Jackson Prairie and a belt of hills called the Buhrstone Cuesta. Parts of Mobile and Washington Counties and Potential Reservoir Development No. 2 on the Escatawpa River in Alabama are in the drainage basin.

The northern and western limits of the basin are practically contiguous with the Pearl River Drainage Basin, which is the subject of another appraisal report.

Thirty-six potential major reservoir projects were studied for this area. In addition, the Okatibbee Project in Lauderdale County and the Flint Creek Project in Stone County are under construction at present.

The Pascagoula River Drainage Basin includes large areas of the DeSoto National Forest in Stone, Perry, Lamar and Forrest Counties and the DeSoto National Forest (Chickasawhay Division) in Greene, Wayne and Jones Counties. Bienville National Forest involves portions of Smith, Jasper, Scott and Newton Counties.

Physiography

The area is maturely dissected and heavily forested for the most part. The numerous tributary streams provide locally extensive bottomlands, but these have not been cleared for agriculture to any great degree. The lower courses of the Leaf and Chickasawhay and all of the Pascagoula meander through swampy alluvial valleys. The region slopes from an altitude of 400 feet on the north to 100 feet, merging with the Coastal Pine Meadows.

Though the Pascagoula is navigable for some distance on its lower courses, the Leaf and Chickasawhay could be used only at high stages and then mainly for rafting. Like many other rivers in Mississippi there has been geomorphological alteration since earliest historic times. Land treatment and misuses following the cutting of virgin forests has contributed increasing quantities of sediments to the swiftly flowing streams and they have tended to become choked with silt and driftwood deposits.

II. History

Significant European contact occurred with the French entry into the area and the establishment of a settlement in 1699 at Biloxi by Pierre Le Moyne, Sieur de Iberville. This was, in part, an effort by the French to check Spanish territorial ambitions and to gain control of the Gulf. During the period 1699-1702 the coast and the lower courses of the Mississippi were thoroughly explored from this Biloxi settlement and friendly relations were promoted with the local Indian groups in an effort to thwart Spanish incursions from their new (1698) settlement at Pensacola. In 1702 operations were moved to Mobile Bay, the settlement being called St. Louis. This was in turn moved to a new site (the present city of Mobile) in 1710.

In 1715 Simon dela Pointe received a cession from the Governor of the Province of Louisiana for lands in the Pascagoula area. In 1718 a fort and trading post were erected in what is now the city of Pascagoula. This effort was part of a general construction and settlement program which included the establishment of a post at Natchitoches on the Red River (1713), Ft. Toulouse on the Alabama River (1714) and Ft. Rosalie at Natchez (1716). However, the next fifty years saw little further significant activity in the Pascagoula area.

Under the treaty in 1763 ending the Seven Years War, France ceded its territory east of the Mississippi to England. The Pascagoula drainage area became part of British West Florida, which included lands between the Chattahoochee and Apalachicola Rivers on the east and the Mississippi River on the west. The north boundary was at thirty degrees latitude and was later moved to thirty-two degrees, twenty-eight minutes. There were no English forts constructed in the Pascagoula area during this time, the closest being Ft. Charlotte at Mobile. In 1781 the Spanish gained control over West Florida and the fort which had been erected at Pascagoula by the French in 1718 became the "Spanish Fort" by which name it is known today.

By 1798 the Pascagoula area came into the domain of the United States. In 1805 it was ceded by the Choctaws to become part of the previously established Territory of Mississippi. The lands south of the thirty-first parallel were still owned by the Spanish but were acquired by the United States for inclusion in the Mississippi Territory in 1810.

Generally speaking, little significant activity occurred in the area after the initial French entry. The Pascagoula Basin was mostly cut off from the American Revolution and the ensuing creation of the United States. The same holds true for the Mexican War and the American Civil War. Most of the natural resources of the area did not undergo any development until after 1870. Lumbering and ship building early became important to the economy and remain so today, with the commercial fishing industry becoming prominent only after World War I.

Today, various sites of local significance, such as the Old Place Plantation at Gautier, remain and are accessible to the public. The only site of more than local significance noted by the survey is the "Old Spanish Fort" at Pascagoula. It is presently operated as a museum by the Jackson County Historical Society.

III. Archeology

General

Archeological knowledge of sites and aboriginal cultures of the region under consideration can be said to be virtually non-existent. The difficult terrain, heavy vegetation and the lack of conspicuous mounds or other manifestations has not engendered the enthusiasm of either amateurs or professional investigators that the more productive and better known sites have elicited in the northern and western parts of the state.

At the present time occasional reports come in about sites scattered over various parts of the area. For the most part these seem to be village or camp sites and cultural material is sparse. These reports are from ambitious amateurs and reflect a personal interest confined to very small localities. Their diligence is rewarded by finding very few sites yielding only a few weathered shreds and occasionally flint chips and projectile points. Reported mounds turn out to be erosional remnants more often than not, though evidence of stone working is often associated with them. Thus the spottiness of known sites probably is a function not only of a scarcity of sites, but also the difficult terrain and heavy vegetation at most seasons of the year which discourages efforts at identification of archeological areas.

The results of the special interest of one or two individuals in a particular area is manifested by seven sites in Jackson County on the lower reaches of the Pascagoula River and in the town of Pascagoula. Most of these have disappeared since they were first searched out in 1933 by a field party of the Mississippi Department of Archives and History. Some of the small, apparently burial mounds had been pitted at that time by treasure hunters. Limited digging by the field party yielded some potsherds and occasionally decayed bones. This material has been lost and it is impossible to identify some of the pottery types from the descriptions. The presence of "heavy scroll designs" and punctations might indicate cultural stages from Tchefuncte through Troyville occupations. Shell tempered pottery occurred at two or three locations, and the finding of a frog effigy vessel by a local resident seems to indicate a generalized Mississippi cultural stage.

Description of the Sites

The site Jk-7 a few miles up the west arm of the Pascagoula River on the west bank yielded historic trade material as well as shell tempered incised pottery. This was seen in a local collection in 1933 and is no longer available; most probably the site was a historic Biloxi or Pascagoula village as recorded by the French.

From the lower Pascagoula River to the upper reaches of the Chickasawhay there is an archeological blank of sixty miles before evidence is found of sites, the result of special interest of another investigator. Henry B. Collins of the U. S. National Museum ventured into the area to attemp to locate historically documented Choctaw towns. He collected from the surface at Coosa in Lauderdale County (Ld-2), Halunlawasha in Neshoba County, Chichachae in Clark County (Cl-3) and Yowanee in Wayne County (Wy-1). The Coosa and Chichachae sites yielded a sample of Chichachae Combed sherds and historic trade material including gunflints. The other two sites yielded scant materials, but the historic Choctaw pottery was present. He was satisfied, as have been subsequent investigators, that his locations corresponded with the historical record.

During the same period he excavated eight small mounds called the Crandall Site (Cl-1) and the Hiwannee Site (Wy-1) which consisted of seven small mounds. He found burials of from one to fifteen individuals and some evidence of cremation. There is no discussion of the pottery or other artifacts. There is also some confusion in the survey documents as to whether Yowannee is at or near the same location as Hiwannee. They are catalogued under the same site number in the present survey since no specific location for Yowannee was given. The following year Collins excavated the McRae Site (Ld-1), a concial mound and occupation area. Ford (1936) also investigated the site. On the basis of the pottery and burials the assembly was assigned to the Early Baytown Period.

Five mound sites were reported by the WPA Archeological Survey in Smith County. One of these seems to be an erosional remnant. Nothing is known about the cultural affinities in this area. If Sm-1 was correctly mapped it appears to be in or near the pool area of Potential Reservoir No. 22.

A forester employed by a paper company has taken an interest in locating sites in the forest plots he patrols. He has recorded 46 sites in wooded terrain of both the Pascagoula and Pearl River drainages. These are classified roughly as (1) campsites, (2) campsites yielding pottery and (3) possible village sites. There are 35 in the first category. The identification of these sites and the collections made from them is the result of persistent re-visiting in the course of patrol duties. At any given time a casual observer or even an archeologist might be dissatisfied with the results.

As a test case, five of the sites recorded in early surveys in Smith County and one in Simpson County were checked to see if they could be re-identified in August, 1966.

The Simpson County site (Si-1) is actually in the Pearl River drainage basin and appeared to lie near the dam of Potential Reservoir No. 6 of that area. In 1939 there was evidence of a slight elevation about twenty feet in diameter with some occupational material scattered about. It was reported then that thirty years earlier "tomahawks, perforated stones, etc." were found sporadically while a railroad was being built in the area. Interstate Highway construction has been carried out at the site in the past two years, and the relation of the site to old U. S. Highway is difficult to determine. It would appear that the new construction consisting of four traffic lanes and a median has engulfed the former site location. No reports of cultural material were made by highway construction crews.

Sm-1 was reported to be a large mound in the north one-half of the northwest quarter of Section 35, Township one north, Range seven east. From this it would appear to be in the pool of Potential Reservoir No. 22 of the Pascagoula Drainage Basin.

Inquiry produced the information that there had never been a mound at this location though a few "Indian rocks" and mortars had been found in the cultivated creek bottom about one-half mile south of the survey location. This is well below the dam of the above reservoir.

Sm-2 was reported to be a mound fifty feet high and three hundred feet in circumference. The dimensions are somewhat incredible, but the location was pinpointed by a local informant. The land is hilly and grown up in timber and brush. No conspicuous eminence or evidence of occupation were found or currently reported from the area.

Sm-3 was reported to be a mound in an open field with a specific section designation. The field was easily located with reference to a county road intersection. No mound was present, but the west one-half of the field recently had been converted into a farm pond. Perhaps the purported mound was destroyed.

Sm-4 was originally reported to be a mound near Sylvarena on the Houston place. This location was pinpointed by a local informant and was visited. It is a truncated circular structure, steep sided, at least ten feet high and one hundred-fifty feet in diameter. It was situated on red clay second terrace one mile east of Ichusa Creek. First appearances were promising, but since it was composed mostly of limeston nodules and slabs intermingled with some soil and contained pecten shells, further inquiry into the local geology was made. It was determined that the Vicksburg Limestone formation outcrops frequently in bluffs here. The mound is quite certainly an erosional remnant of this formation.

Sm-5 was reported by the 1941 WPA Survey as being "mounds on Fisher Creek near Taylorsville." The wide bottom of the creek was examined from its confluence with the Leaf River for several miles. New residence construction in the east part of Taylorsville occupied most of the banks of the lower course. No information about former mounds or aboriginal occupation could be elicited from several informants. One middle aged man stated that his father had shown him some "rises" several miles to the south in the Leaf River swamp and told him they were Indian mounds.

The results of this spot check of documented sites characterizes the archeology of the general area. Five camp sites in Jefferson Davis County are similar to those in the adjacent Pearl River drainage. No mounds are involved and the cultural material is so scanty as to make the sites appear rather insignificant. The settlement pattern of the early historic southern Choctaw towns as reported by the French seems to have been similar to that of the prehistoric sites so far recorded. None of the historic Choctaw settlements have been found by archeology.

Two or three mound sites in the northern part of the drainage basin in Wayne, Clarke and Lauderdale Counties were excavated. The incomplete reports indicate that they may be assigned to the Early Baytown period and perhaps related to similar sites in Alabama. One in particular, Ld-1, has features similar to Bynum I phase in Chickasaw County and Miller I in Lee County. The cultural evidence is inconclusive.

The lack of archeological information about southern Choctaw settlements in the heavily wooded Southern Pine Hills is not surprising, since more numerous Choctaw sites in the north central part of the state can no longer be found even under more favorable survey conditions.

Cultural Sequences

The following regional cultural sequence for the general area has been suggested pending more stratigraphic information and the accumulation of more cultural data recovered by systematic excavation.

PHASE	HORIZON	TYPE SITE
Choctaw	Historic	Cl-3, Jk-7, Ld-2
?	Mississippi	Jk-4, Jk-7, Jk-9
Winston	Red filmed and cordmarked pottery (Deasonville ?)	Nanih Waiya
McRae	Marksville-Hopewell	McRae (Ld-1)
Increase	Fabric Impressed Pottery	McRae (Ld-1)

The closest affiliation of the McRae Phase may lie with the Alabama Early Woodland. The Deasonville connection (which may not occur farther south in the basin) is even more obscure. Small or medium sized burial mounds (seventy at one site in Alabama) are reported on the lower Tombigbee (Sears, personal communication). Possibly these extend up that river to the Lee County area of Mississippi in greater numbers.

Summary

To summarize, twenty-two sites have been plotted on the Pascagoula River Drainage Basin map from existing survey and published data. Five of these and a sixth from the immediately adjacent Pearl River drainage were re-checked in the field. The Simpson County site has been destroyed by road building. One that formerly yielded artifacts is quite insignificant at present. The remaining four were either not sites at all or if so no longer exist.

Ten of the survey designations were not mapped because of insufficient locational data. Since they are vaguely described apparently from indirect knowledge it is safe to say that they can be relocated assuming they were not totally destroyed as the area grew during the past thirty years.

Although we can be reasonably certain that there are small sites scattered over the area, it seems improbable that any large settlements or mound sites have been overlooked. Despite difficult access in the

rural communities of the region, certain individuals, such as hunters, fishermen, oil explorers and loggers penetrate and know the terrain of each community well. Information about mounds or accumulations of "Indian rocks" would have been reported and become known to local informants.

IV. Conclusions

1. Generally, it may be said that the archeological resources of the drainage area do not seem too promising. Although the slightest archeological knowledge is important in interpreting a region of such apparent cultural sterility, it doesn't seem probable that very much information will be forthcoming.

2. Exhaustive ground survey would be required to determine if sites are as scarce as they seem to be. Systematic excavation of some of these would be necessary to establish a firm regional sequence. The coastal area was undoubtedly inhabited over a long period of time by a substantial population. This area was the scene of the earliest European settlements too and destruction of aboriginal remains has been thorough.

3. None of the locations mapped or investigated seem to conflict with the proposed reservoir or waterway development. Site Jk-7, on the west arm of the Pascagoula, seems well worth investigating if it is ever threatened with destruction or inundation.

4. The natural features of the area are equally lacking in promise in that there seem to be neither unusual biotic communities nor outstanding formations present.

5. The historical resources of the area are, for the most part, only locally important; there would seem to be few remnants of the early European settlements, such remains having suffered the thorough destruction which the aboriginal remains have undergone.

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PASCAGOULA RIVER COMPREHENSIVE BASIN STUDY

APPENDIX K

GEOLOGY AND GROUND-WATER RESOURCES OF THE PASCAGOULA RIVER BASIN

by

Roy Newcome, Jr.

Prepared by
U. S. Geological Survey, Water Resources Division
as a contribution to the
Pascagoula River Comprehensive Basin Study

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GEOLOGY AND GROUND-WATER RESOURCES OF THE PASCAGOULA RIVER BASIN

By

Roy Newcome, Jr.

ABSTRACT

Abundant ground-water resources underlie the Pascagoula River basin. These resources have been developed intensively in only a few places, namely Hattiesburg, Laurel, Meridian, and Pascagoula. Seepage from the ground-water reservoirs sustains the base flows of the Leaf, Chickasawhay, Pascagoula, and Escatawpa Rivers and their tributaries.

The fresh-water-bearing section is 300 to 3,500 feet thick and is composed chiefly of sand and clay of Eocene to Recent age. Major rock units represented are the Wilcox, Claiborne, Jackson, and Vicksburg Groups and formations of Miocene and Pliocene ages.

Aquifers in the Claiborne Group provide water for all purposes in the northern third of the basin. The Claiborne is underlain by the potentially important but virtually untapped Wilcox Group. Miocene aquifers are the main source of water supplies in the southern half of the basin, but Pliocene aquifers furnish most supplies in the Jackson County area at the basin's southern extremity.

Much of the fresh-water section has undergone no water-supply development because of the great depth of many aquifers and the availability, at shallow depths, of supplies adequate for present needs. However, it is probable that a large part of any substantial increase in ground-water withdrawal will come from wells deeper than those commonly drilled in the region.

Ground-water levels are within 50 feet of the surface in most places, and flowing wells are common in the valleys and near the coast. Water-level declines due to pumping have become serious problems only in a few localities of heavy withdrawal. In most of these places redistribution of pumpage would alleviate the problem of excessive drawdown.

Although few wells in the basin yield more than 500 gpm (gallons per minute), yields of 2,000 gpm or more could be reasonably expected from efficiently constructed wells almost anywhere in the region.

Total ground-water pumpage is estimated to be about 60 mgd (million gallons per day). Potential pumpage is many times that figure. Well fields capable of yielding several million gallons of water per day would be feasible in most places.

Ground water of good to excellent quality is available throughout the basin; however, some chemical constituents in some aquifers exceed

recommended drinking-water standards. Most of the water is a sodium bicarbonate type. It usually is soft and has a low to moderate dissolved-solids content. Excessive iron is a problem in places, particularly where water supplies are obtained from shallow aquifers, but at least a part of the iron problem results from corrosion of well and distribution-line fittings by the slightly acidic water.

Salt-water encroachment is a potential problem in the coastal area, but little increase in saltiness has been observed in monitor wells in the period 1960-65. Saline-water resources are available for development at considerable depth in most of the region.

OBJECTIVE OF REPORT

This report, describing the geology and ground-water resources of the Pascagoula River basin, was prepared at the request of the Corps of Engineers, U. S. Army, as part of a comprehensive program to appraise the resources of selected river basins. The ultimate purpose of the program is to present facts that will lead to optimum development of the natural and cultural resources of large areas constituting the river basins. Other basin studies underway in Mississippi are for the Big Black and Pearl Rivers.

In scope this report deals with the major aspects of ground-water occurrence and development and their interrelation with the geology of the selected region. No attempt is made to give detailed descriptions of specific localities or even of counties — that is reserved for future investigations. Most of the material from which the report was prepared is in the files of the U. S. Geological Survey and in detailed reports covering parts of the Pascagoula River basin and adjacent areas.

DESCRIPTION OF AREA

Most of southeastern Mississippi and a small part of southwestern Alabama are included in the Pascagoula River basin (fig. 1).

The basin contains all or parts of 22 counties in Mississippi and parts of 3 counties in Alabama; the total area is about 9,700 square miles.

Landforms in the basin consist of low, rounded hills, stream flood-plains, and coastal flats. Elevations range from sea level to about 700 feet. Local topography is rugged in the northeast corner of the basin, but gently rolling to flat in the remainder of the area.

Major streams, in addition to the Pascagoula River, are the Leaf, Chickasawhay, and Escatawpa Rivers. The sub-basins drained by these streams are shown on the location map (fig. 1). Average discharge of the Pascagoula River at Merrill is 9,587 cfs (cubic feet per second).

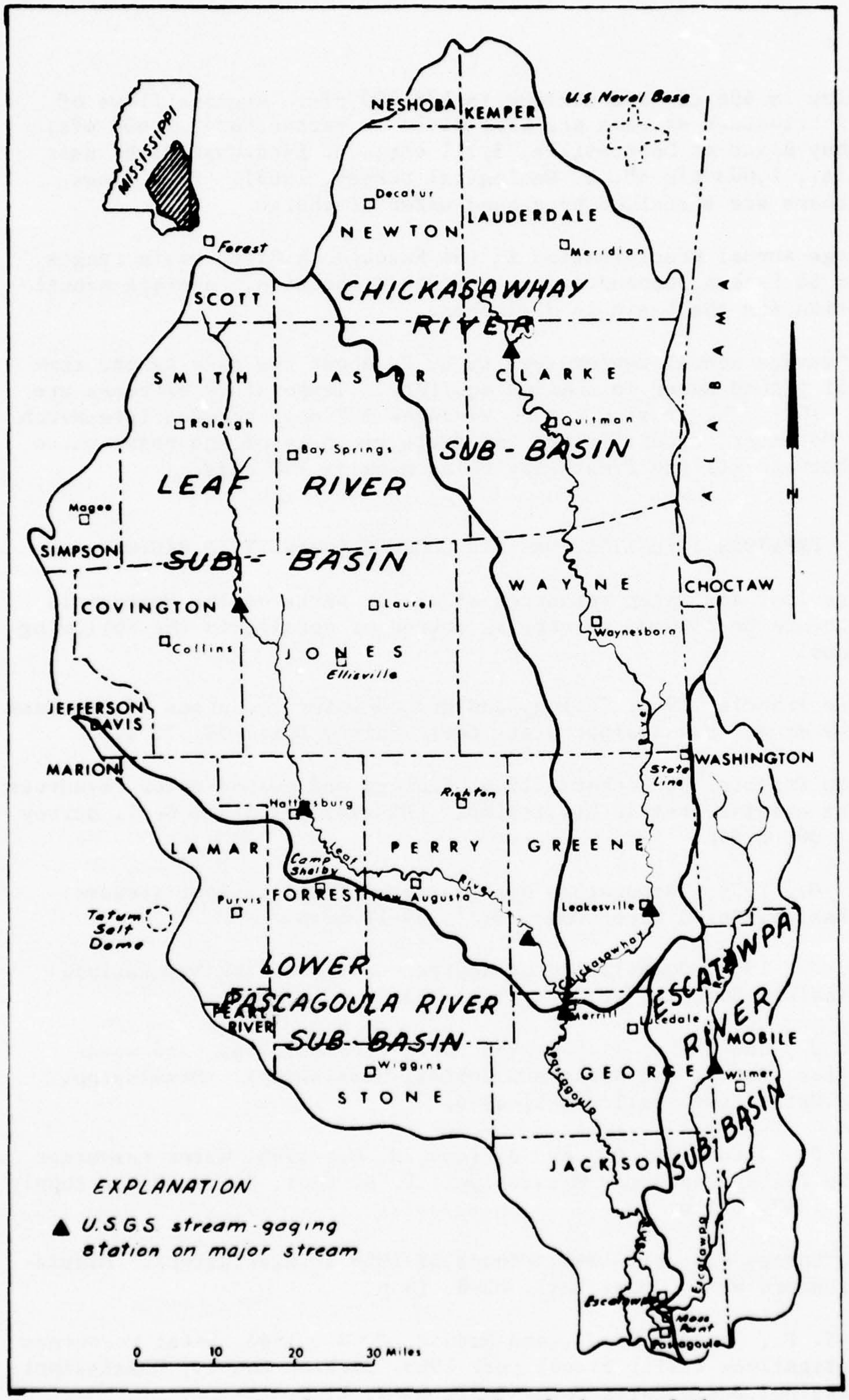

Figure 1.--Map showing location and major drainage of the Pascagoula River basin.

Minimum flow is 696 cfs and maximum is 178,000 cfs. Average flows of the larger tributary streams are Leaf River at Hattiesburg, 2,608 cfs; Chickasawhay River at Leakesville, 3,711 cfs; and Escatawpa River near Wilmer, Ala., 1,003 cfs (U. S. Geological Survey, 1963). Base flows of the streams are sustained by ground-water discharge.

Average annual precipitation in the Pascagoula River basin ranges from 50 to 64 inches, depending on geographic location. Average annual precipitation for the basin is 57 inches.

The average annual temperature is 66°F, about the same as the temperature of ground water in shallow aquifers. Temperature extremes are +110° and -10°. The growing season averages 222 days between late March and early November, except in the immediate vicinity of the coast where the time between killing frosts may be as much as 290 days.

PREVIOUS INVESTIGATIONS AND CURRENT ACTIVITY IN REGION

The geology and water resources of all or parts of the Pascagoula River basin are described, in varying degree of detail, in the following publications.

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Wilson, Kenneth V., 1963, Floods of 1960 in Mississippi: Mississippi Board Water Comm. Bull. 63-9, 9 p.

Current water-resources investigations by the U. S. Geological Survey are under way in the Forrest-Perry-Greene-Jones-Wayne County area, in Lamar County (special study related to AEC testing at Tatum Dome), and in the Jackson-George County area.

SUMMARY OF GEOLOGY

The Pascagoula River basin is in the Gulf Coastal Plain physiographic province. The basin is a topographic feature only and not a geologic entity. Exposed rock formations are sedimentary in origin and range in age from early Eocene to Recent (table 1). Sand and clay in various proportions constitute most of the formations — a few thin units consist of marl or limestone. Sand beds are irregular in thickness and few can be traced with assurance more than a few miles; however, sandy zones, as differentiated from clayey zones, are readily correlated over substantial areas — some throughout the basin.

Table 1.--Stratigraphic units in the Pascagoula River basin and their water-bearing character

System	Series	Stratigraphic unit		Uneroded thickness (feet)	Water resources
Quaternary	Recent		Alluvium	0 - 100	Not important aquifer. Near coast, where thickness is substantial, the aquifer is intruded by salty water.
	Pleistocene		Terrace deposits	0 - 100	Large quantities of water available but relatively untapped. Intruded by salty water from tidal estuaries near coast.
Tertiary	Pliocene		Citronelle Fm	0 - 150	Supplies shallow domestic wells over much of basin and a few municipal wells.
			Graham Ferry Fm	150	Main source of water supply for municipal and industrial use in the Pascagoula area.
	Miocene		Pascagoula Fm	1,500 - 2,000	Main source of water supply for domestic, industrial, and municipal users in more than half of basin. Difficult to differentiate in subsurface, but all three units contain thick aquifers capable of supplying large quantities of water.
			Hattiesburg Fm		
			Catahoula Sandstone		
	Oligocene	Vicksburg Group	Undifferentiated	250 - 550	Not generally an aquifer, but limy beds yield water to wells locally.
			Forest Hill Sand		Good source of water supply locally, but sand too fine in many places.
	Eocene	Jackson Group	Yazoo Clay		Not an aquifer.
			Moodys Branch Fm		Not an aquifer.
		Claiborne Group	Cockfield Fm	850 - 1,100	Contains significant aquifers locally, but not generally a source of large water supplies.
			Cook Mountain Fm		Not an aquifer.
			Sparta Sand		Source of water supply for several municipalities in northern part of basin. Large additional supplies available.
			Zilpha Clay		Not an aquifer.
			Winona Sand		Good aquifer locally.
			Tallahatta Fm		Meridian Sand Member is potentially important but generally untapped source of water supply in northern half of basin.
		Wilcox Group	Undifferentiated	1,100 - 2,000	Large quantities of water available but untapped in northern third of basin. Best aquifers are in basal part of group.

The beds dip south-southwestward at 25 to 80 feet per mile. Dip is steepest across the southern half of Jackson County (pl. 1) where the weight of deltaic sediments that accumulated during the late part of the Tertiary Period caused the greatest downwarping. This downwarping becomes even more pronounced farther westward along the Gulf Coast toward the axis of the Mississippi River trough. The dip approaches 100 feet per mile in Hancock County.

The Moodys Branch Formation of late Eocene age is a thin but easily recognized marker bed underlying most of the Pascagoula River basin. A contour map (fig. 2) on this formation illustrates the general attitude of the formations in the region.

AVAILABILITY OF GROUND-WATER SUPPLIES

Fresh-Water-Bearing Section

Fresh ground water[1] is available in the Pascagoula River basin to depths ranging from near sea level elevation on the northeast margin to more than 3,000 feet below sea level in the west-central part (fig. 3).

All the exposed formations of the basin are fresh water bearing. The fresh-water section ranges in thickness from 300 to 3,500 feet. It is thinnest in the northeast and it thickens southward into the Smith-Jasper-Wayne County area where fresh water extends farthest south in the basal part of the Wilcox Group. From this area southward the fresh-water section ranges between 1,900 and 700 feet in thickness. Greene and Perry Counties and southern Wayne County have a relatively thin fresh-water section restricted to rocks of Miocene age and younger.

Location and Extent of Aquifers

A map of the general distribution of ground water according to geologic units (fig. 4) shows that beds of Miocene age constitute sources of ground-water supplies throughout the southern two-thirds of the basin and the only significant sources in about half of the basin.

The Claiborne Group furnishes practically all existing ground-water supplies in the northern third of the region. Although the underlying Wilcox Group occupies about 1,000 feet of the fresh-water section in that area, the Wilcox is virtually untapped for water supplies.

The Miocene and Wilcox beds seldom contain fresh water in the same locality. Miocene and Claiborne aquifers, however, are both present in a band underlying the northern halves of Covington, Jones and Wayne Counties. In this area nearly all water supplies are obtained from the shallower Miocene beds.

- -

[1] Fresh water is defined as water containing less than 1,000 ppm (parts per million) of dissolved solids.

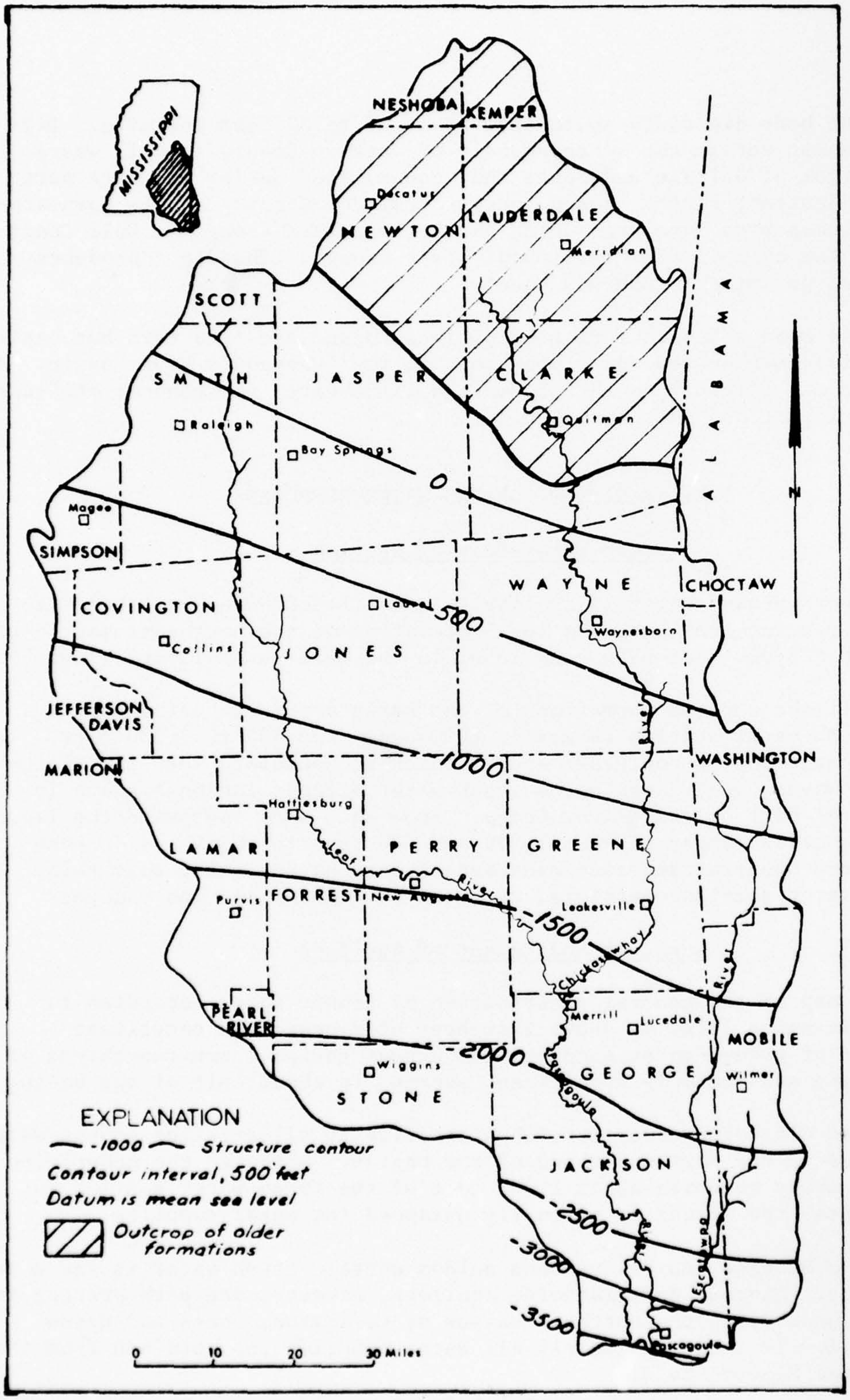

Figure 2.-- Structure map on the Moodys Branch Formation or equivalent.

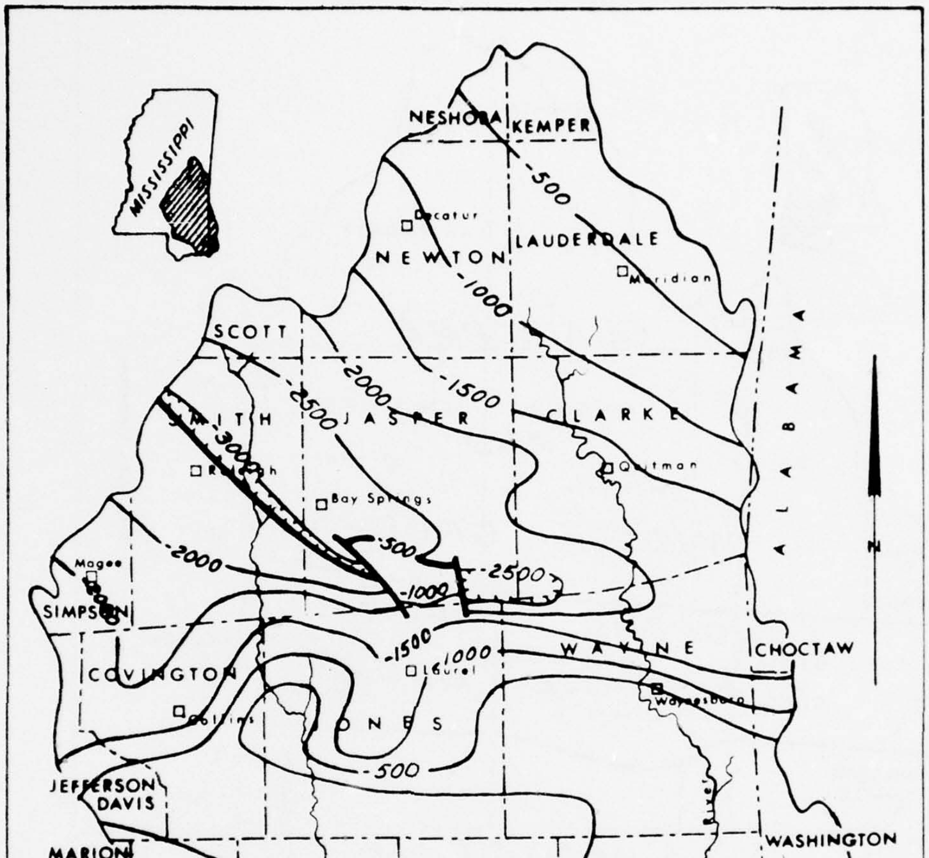

Figure 3.--Contour map showing elevation of the base of fresh water in the Pascagoula River basin.

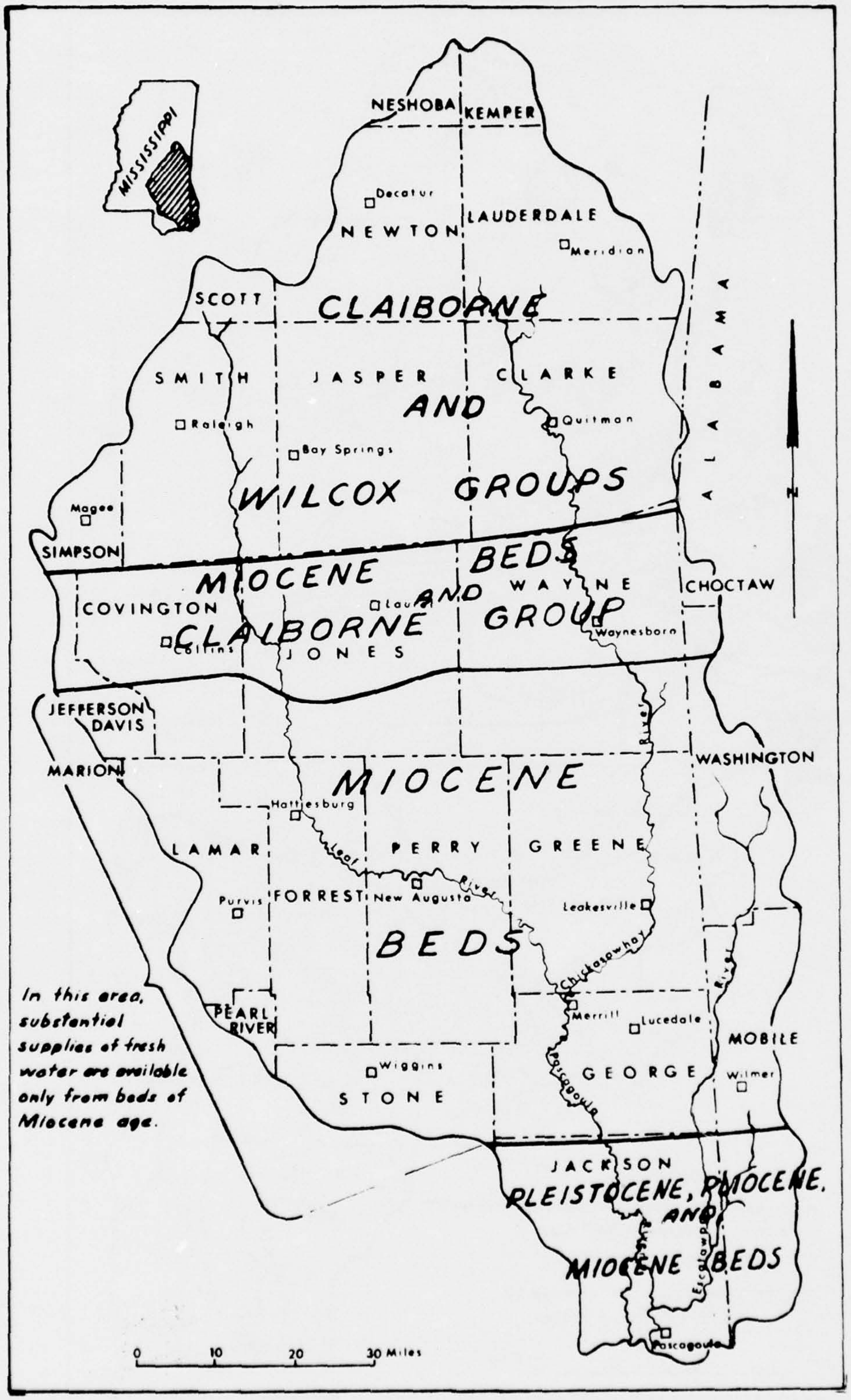

Figure 4.--Distribution of fresh-water aquifers in the Pascagoula River basin

In Jackson County, Miss., and the southwestern part of Mobile County, Ala., fresh water can be obtained from geologic units of Pleistocene, Pliocene, and Miocene ages. The Pleistocene deposits are comparatively thin; most ground-water-supply development is in the underlying Pliocene beds, although the Miocene aquifers supply some municipal users.

Table 2 contains representative data obtained from electric logs of selected oil tests and water wells (fig. 5). These examples of fresh-water sand occurrence at various localities throughout the Pascagoula basin emphasize availability of the untapped ground-water resources. The relation of fresh-water sand zones across the basin is illustrated by electric-log cross sections A-A' and B-B' (pls. 2 and 3).

Depth of Wells

Drilled water wells in the Pascagoula basin range in depth from about 50 feet to more than 1,000 feet. At least 60 percent of the wells are less than 300 feet deep; however, the average depth of wells near the coast is greater than in the northern and central parts of the basin. The following table provides a statistical comparison of well depths for three counties representing the northern, central, and southern parts of the basin.

Well depth (ft)	Percentage of wells		
	Lauderdale Co.	Jones Co.	Jackson Co.
Less than 100	7	27	26
100-199	26	26	12
200-299	37	25	15
300-399	18	6	13
400-499	4	7	5
500-599	0	5	6
600-799	5	1	8
800-999	2	0	10
1,000 and more	1	3	5
Number of wells used in computation	271	161	687

There is little doubt that a large part of any substantial increase in ground-water withdrawal will come from wells deeper than those commonly drilled in the region. The great thickness of the fresh-water section and the massiveness of many of the deep-lying beds of sand invite exploration and development of these untapped sources of supply.

Table 2.--Fresh-water sand intervals in the Pascagoula River basin

(Data from electric logs of oil tests)

County	Clarke	Covington	Forrest	George	Greene	Greene	Jackson	Jasper
Map number[1]	20	11	15	4	13	27	1	20
Location	Quitman, 3 mi. E	Collins, 3½ mi. E	Hattiesburg, 10 mi.S	Lucedale, 6 mi. SW	Leakesville, 11 mi.NW	State Line, 4 mi. W	Vancleave, 9 mi. NW	Paulding, 5 mi. SW
Elevation (ft)	265	415	360	190	290	140	110	350
Top of log (ft)	400	441	50	100	104	100	148	100
Sand intervals (ft)	590-670 725-745 780-820 860-900 1410-1450 1520-1605 1870-1900	510-540 560-585 610-695 760-820 895-955 1790-1900	350-580 710-910 950-1270 1450-1580	670-730 990-1020 1050-1075 1100-1140 1170-1230	360-380 490-615 665-710 805-830	85-210 275-465	540-630 695-790 1110-1155 1470-1600	240-385 610-750 1115-1175 2515-2650 2680-2780

County	Jones	Kemper	Lamar	Lauderdale	Neshoba	Newton	Perry	Perry
Map number[1]	71	3	26	16	8	3	32	64
Location	Laurel, 3 mi. SW	DeKalb, 10 mi. SW	Purvis, 5 mi. NW	Meridian, 4 mi. NE	House, 1 mi. SW	Decatur, 5 mi. SW	Richton, 4 mi. S	Janice, 1½ mi. SE
Elevation (ft)	285	555	385	475	495	485	215	165
Top of log (ft)	89	153	75	270	261	295	94	422
Sand intervals (ft)	170-250 365-465 965-990	285-345 370-550	75-275 800-940 1130-1490 1580-1640 1680-1800	415-425 590-620 750-825	355-365 740-900 1000-1065	720-880 1745-1855	100-250 410-520 650-750	490-640 905-960

County	Scott	Smith	Smith	Stone	Wayne	Wayne	Mobile (Ala.)
Map number[1]	31	34	57	28	27	127	2
Location	Norris, 3½ mi. SE	Magee, 5 mi. E	Raleigh, 5 mi. NE	Wiggins, 5 mi. SW	Strengthford, 5 mi.S	Matherville, 1½ mi.SW	Reiking, 6 mi. SE
Elevation (ft)	550	535	435	195	285	250	295
Top of log (ft)	113	161	50	56	78	335	53
Sand intervals (ft)	260-425 620-820 1195-1380 1645-1700 2450-2760	161-470 570-620 680-720 1120-1320 1570-1980	140-160 515-650 845-900 1020-1200 1970-2020 3350-3385 3420-3490	56-140 180-250 600-640 760-1130 1240-1600 1750-1810 1830-1860	110-170 300-440 540-640	490-530 875-975 1460-1490 1810-2120	53-275 390-450 685-720

[1] Figure 5.

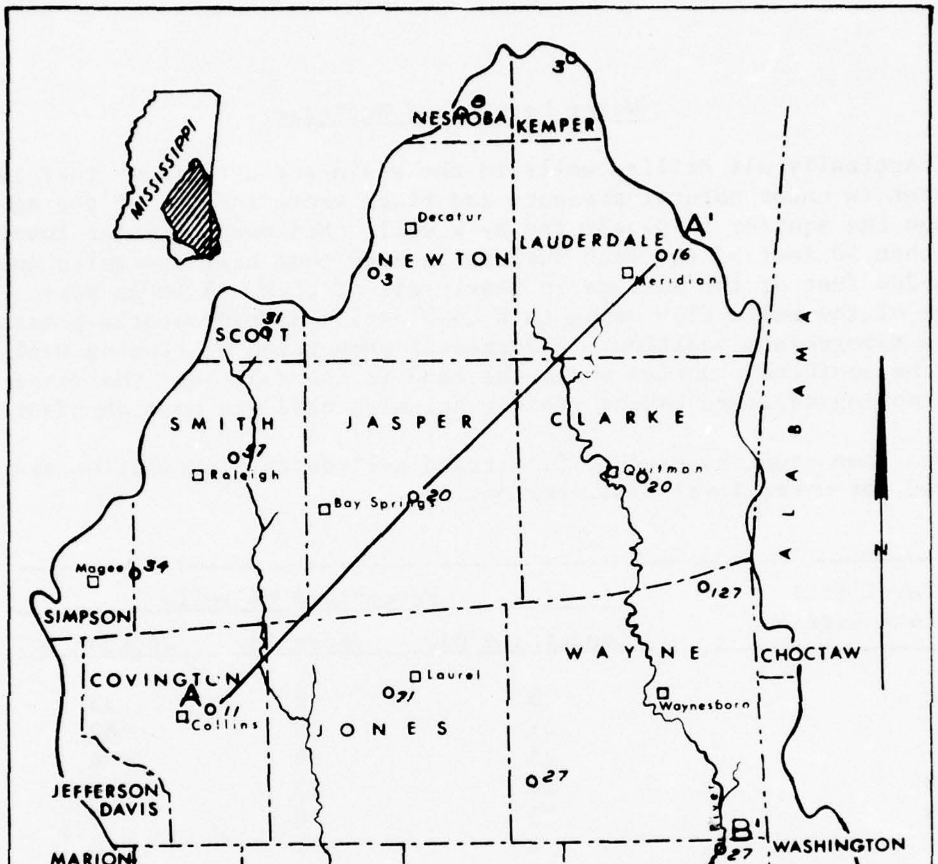

Figure 5.--Location map of oil tests used in determining thickness of fresh-water sands and in constructing cross sections.

Water Levels and Recharge

Practically all drilled wells in the basin are artesian – that is, the water is under natural pressure and rises above the top of the aquifer when the aquifer is penetrated by a well. Non-pumping water levels are within 50 feet of the land surface in more than half the wells and within 200 feet of the surface in nearly all of them. A large percentage of the wells flow owing to a combination of hydrostatic pressure and low topographic position. The greater proportion of flowing wells is in the southern counties where the land is low and where the deeper wells tapping aquifers having greater artesian head are more abundant.

The same counties used to illustrate well-depth distribution are analyzed for water-level distribution.

Water level (ft) below land surface	Percentage of wells		
	Lauderdale Co.	Jones Co.	Jackson Co.
Flowing	8	8	33
0-49	41	40	62
50-99	23	29	4
100-199	24	23	1
200-299	3	0	0
300 and more	1	0	0
Number of wells used in computation	224	113	639

Ground-water levels are declining in many places in the basin. Declines take place at a slow rate (usually less than 1 foot per year) where they result only from land-use changes and low-rainfall phases of the climatic cycle, but at higher rates in areas of large withdrawal through wells. Hydrographs (figs. 6 and 7) show water-level trends and the effect of changes in pumping on water levels.

In a few places, where substantial withdrawals are made, water-supply problems have developed as a result of lowered water levels. Where feasible the problems can be alleviated by redistribution of pumpage, either geographically or stratigraphically or a combination of the two.

Recharge to the ground-water reservoirs in the basin takes place in upland areas where the aquifers crop out or are covered by a thin mantle of permeable sediments of Pliocene and Pleistocene ages. Although the younger formations crop out in the basin and receive recharge there, most recharge to the basal beds of the Wilcox Group occurs outside the basin in the uplands of Kemper and Neshoba Counties on the north.

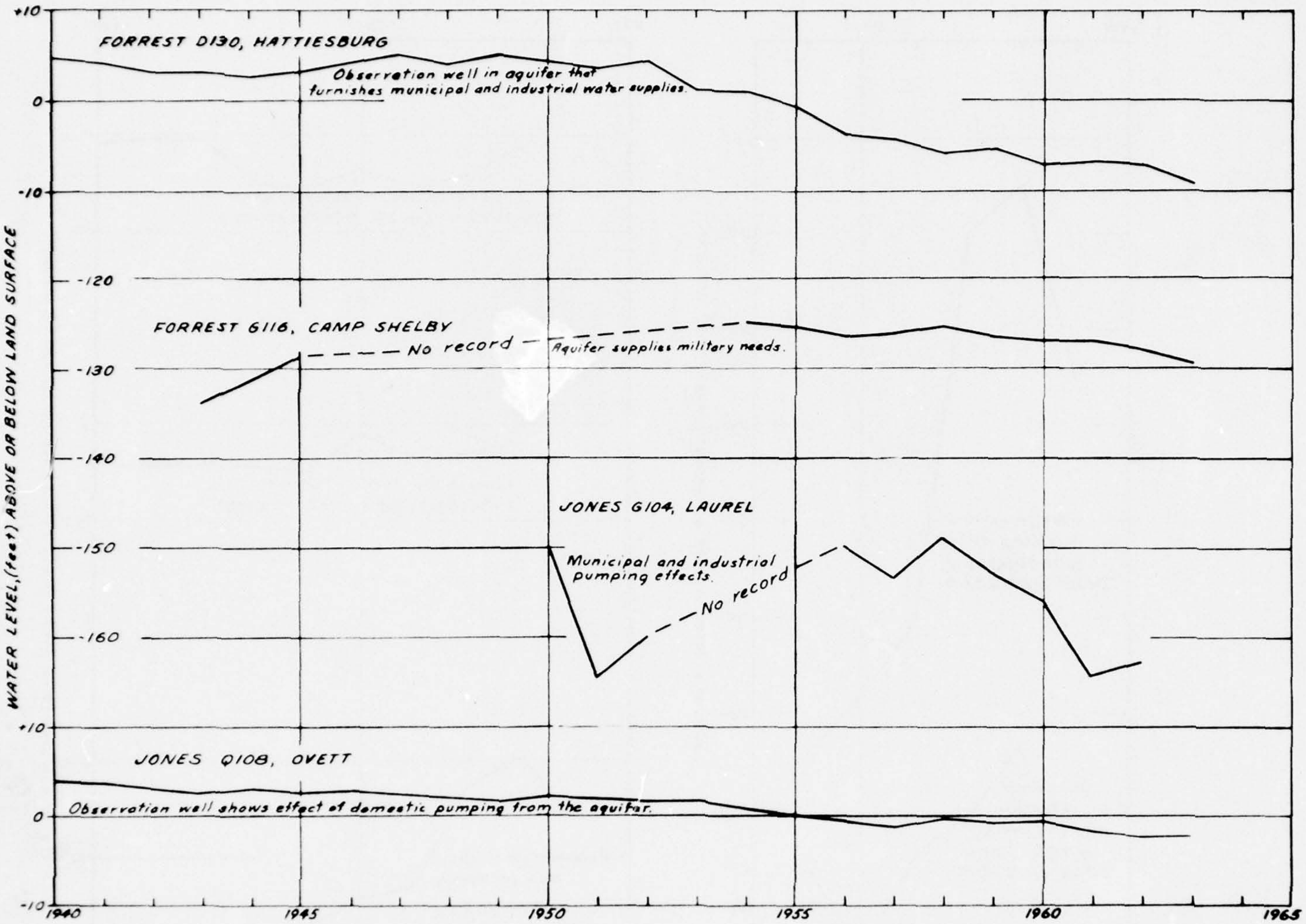

Figure 6.--Hydrographs of observation wells in the Pascagoula River basin (annual low water levels).

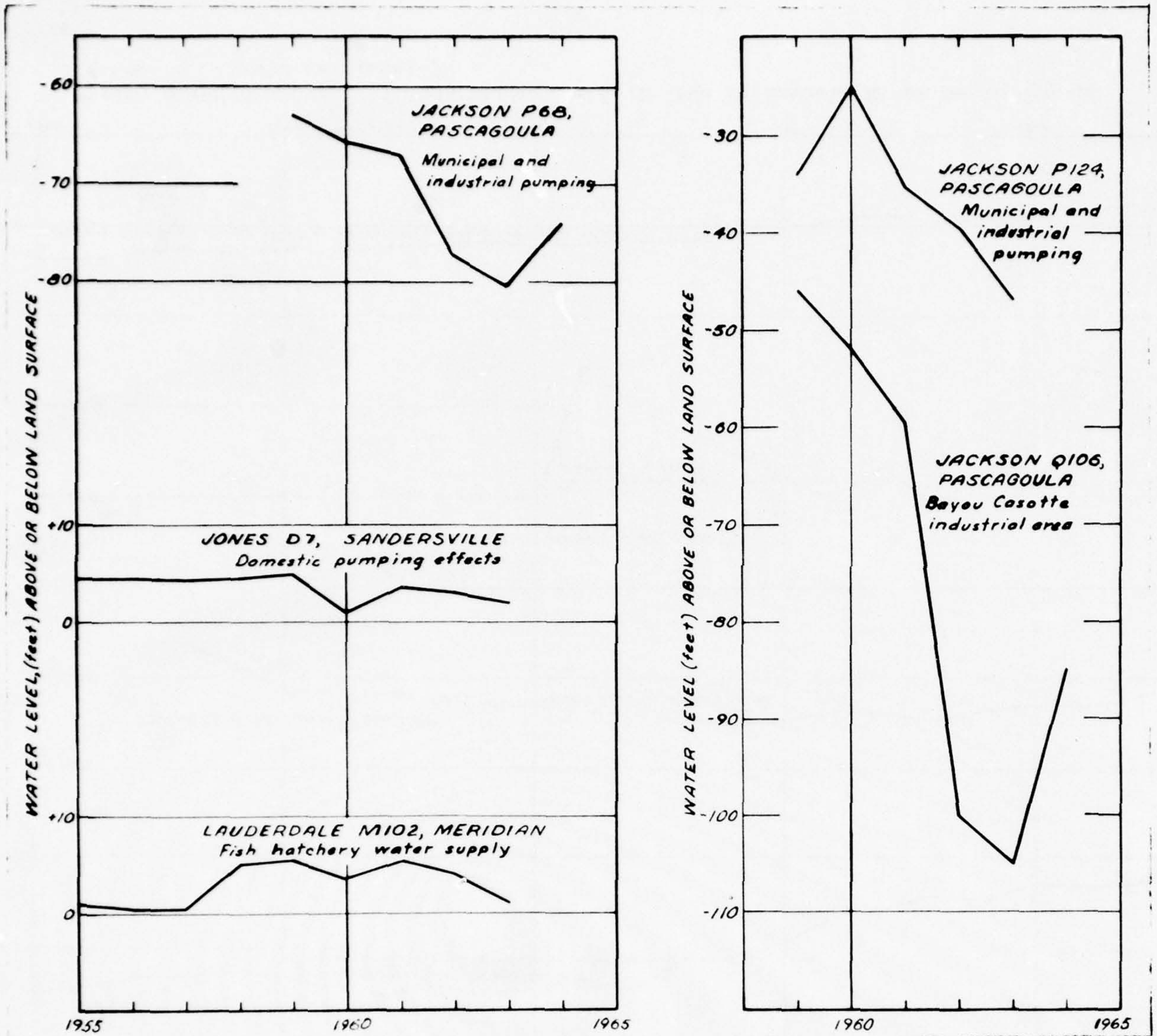

Figure 7.--Hydrographs of observation wells in the Pascagoula River basin (annual low water levels).

Artesian head is imparted to the water as it moves down the gradient in the aquifers and becomes confined between impermeable beds. Part of the head is lost due to friction, but that remaining commonly is sufficient to force the water many feet above the land surface when the aquifers are penetrated by wells. This is particularly true of deep aquifers that have undergone little or no exploitation and which contain water under sufficient pressure to cause its rise to 100 feet or more above sea level.

Aquifer Characteristics

The artesian aquifers of the Pascagoula basin differ greatly in their capacity for transmitting water. Coefficients of transmissibility computed from pumping tests range from 2,800 to 200,000 gpd (gallons per day) per foot and coefficients of storage do not vary much from 0.0001 (table 3). Because of the two variables — aquifer thickness and coefficient of permeability — whose product is the coefficient of transmissibility, the latter must be obtained either directly by pumping test or indirectly by multiplying the aquifer thickness times a known or assumed coefficient of permeability.

Permeabilities of 110 to 2,250 gpd per square foot have been determined in the basin; it is probable that these values span the range of permeability for the significant aquifers of the region and that most permeability values fall within a 300 to 1,000 range. The limited number of pumping tests available does not permit conclusions on the relative permeability of the water-bearing units. However, the great thickness of many Miocene sand beds implies generally higher transmissibility for that part of the geologic section, and it is transmissibility and available drawdown that determine how much water a well can be expected to yield.

The practical application of measured or assumed aquifer characteristics is in predicting the yields of wells and the effects of ground-water withdrawal. A graph (fig. 8) relating transmissibility to drawdown and well yield is useful in estimating well yields and pump settings. Many of the sand beds listed in table 2 are capable of maintaining well yields in excess of the 2,500-gpm (gallons per minute) limit of the graph; however, not many wells are constructed to supply more than that amount.

An example of the graph's use follows:

> An electric log of a test hole showed a 40-foot thickness of sand at a depth of 500 feet. From other wells tapping that aquifer the static water level is known to be 50 feet below land surface. How deep should a pump be set to supply 1,000 gpm from a 12-inch well?
>
> Figuring conservatively that the permeability of the aquifer is 500 gpd per square foot, the transmissibility would be 20,000

TABLE 3

Aquifer characteristics determined from pumping tests in and near the Pascagoula River basin

County	Location of test	Water-bearing unit	Depth (ft)	Thickness (ft)	Coefficient of transmissibility (gpd/ft)	Coefficient of permeability (gpd/ft²)	Coefficient of storage	Theoretical specific capacity of wells (gpm/ft)
Forrest	Camp Shelby	Hattiesburg	400	70-108	32,000-133,000	310-1,590	0.0002-.0005	16-60
Do	Hattiesburg	Catahoula	400	100	178,000	1,780	--	80
Do	do	do	600	80	32,000	400	.00005	16
Do	do	do	607	50	48,000	960	.0003	23
Do	Hattiesburg Airport	Hattiesburg	190	--	124,000	--	.0002	54
Greene	Leakesville	do	125	25	2,800	110	--	1
Do	State Line	Catahoula	205	58	27,000	470	--	13
Jackson	Bayou Casotte(Pascagoula)	Citronelle	200	80	45,000	560	.0006	22
Do	do	Graham Ferry	360	60	20,000	330	.0002	10
Do	do	do	375	50	24,000	480	--	12
Do	do	do	350	80	25,000	310	.0003	12
Do	Escatawpa	Pascagoula	450	--	40,000	--	.0003	18
Do	Moss Point	do	950	56	60,000	1,100	.0001	26
Do	do	do	830	80	60,000	750	.0007	28
Do	Pascagoula	Graham Ferry	320	100	54,000	540	.0005	25
Jones	Ellisville	Catahoula	550	80	40,000	500	.0002	18
Do	Laurel	do	395	100	44,000	440	.0003	21
Do	do	do	410	59	17,000	290	--	8
Lamar	Tatum Salt Dome	Hattiesburg	680	80	33,000	400	--	16
Do	do	Caprock	1,026	--	8,000	--	.0001	4
Lauderdale	Meridian, Kroehler Plant	Wilcox	834	120	90,000	750	--	44
Do	Meridian Fish Hatchery	do	729	--	26,000	--	--	13
Do	U. S. Naval Base	do	215	100	76,000	760	.00002	35
Do	do	do	210	89	200,000	2,250	.0002	90
Perry	Richton	Hattiesburg	750	--	6,000	--	--	3
Scott	Forest	Cockfield	350	130	64,000	470	.0004	30
Stone	Wiggins	Pascagoula	200	100±	82,000	800±	.010	44
Do	do	do	400	60	27,000	450	--	13
Wayne	Waynesboro	Vicksburg	120	55	25,000	450	--	12
Do	Waynesboro Tree Nursery	Citronelle	190	52	58,000	1,025	.0001	24

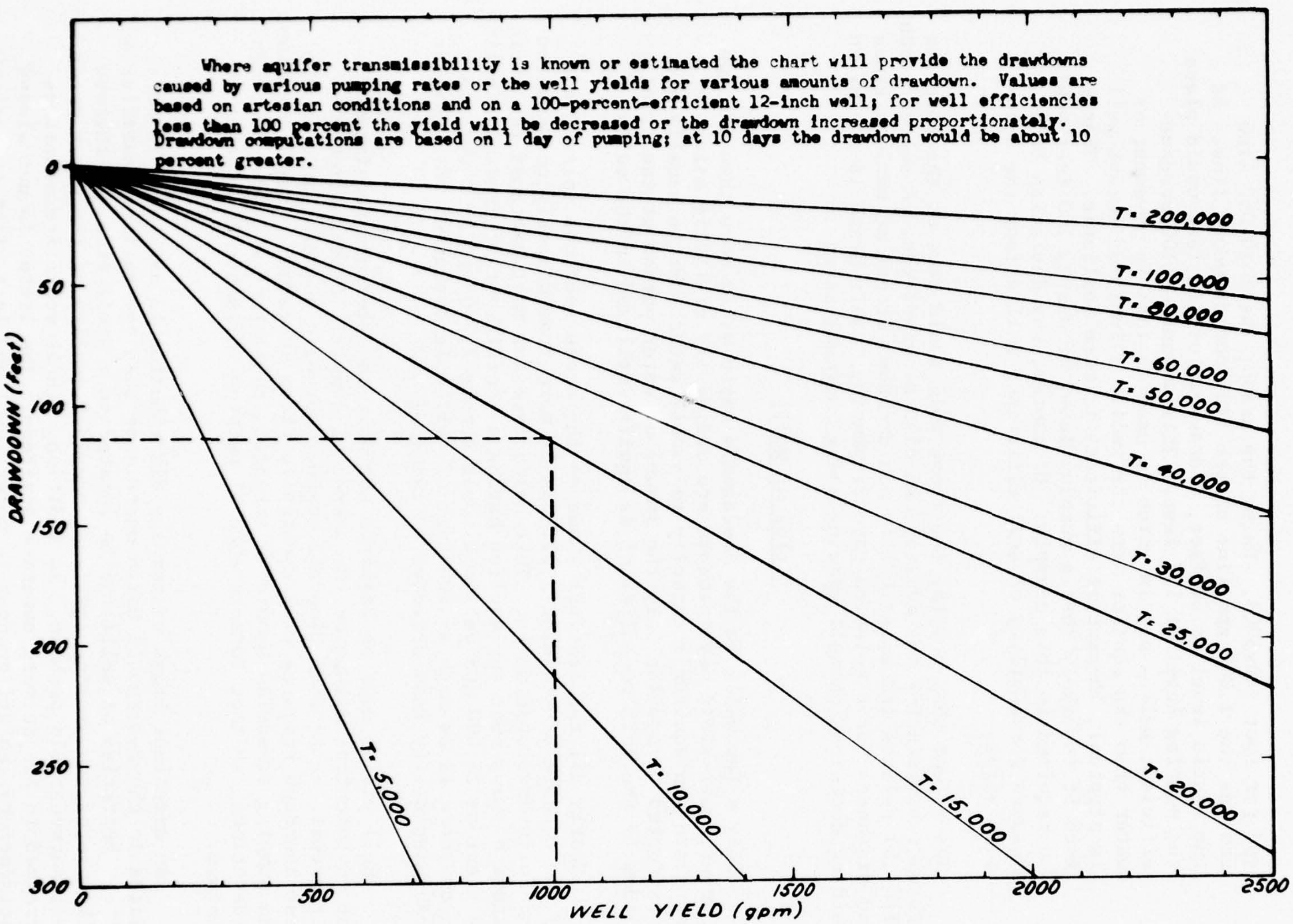

Figure 8.--Graph of transmissibility - drawdown - yield relationship.

gpd per foot (40x500). Using the graph, the T=20,000 line crosses the 1,000 gpm line at the 115-foot drawdown line. As the static level is 50 feet, a drawdown of 115 feet would place the pumping level at 165 feet. This assumes a 100-percent-efficient well — one in which no head is lost in movement of water from the aquifer into the well. A fully efficient well is atypical; 75-percent efficiency is more realistic. Therefore it is likely that a pumping level of nearly 200 feet would be required in this example. Of course, any deviation from the assumed permeability or well efficiency will affect the drawdown value.

The effect that pumping the above well would have on the artesian pressure surface for the aquifer can also be predicted. A second graph (fig. 9) relates transmissibility and drawdown effect at various times and distances for a selected rate of pumping. This graph is useful in guiding decisions on well spacing and withdrawal rates.

Yields of Wells

Only a few wells in the Pascagoula basin yield more than 500 gpm. However, well-yield measurements are ordinarily of little value in appraising an aquifer's capacity to supply water. Wells usually are constructed to provide only the amount of water needed at the time; seldom is the full potential of an aquifer utilized in the wells.

Nearly all the aquifers shown on the cross sections (pls. 2 and 3) are capable of yielding 2,000 gpm or more from properly constructed and fully developed wells. This holds true for most parts of the basin. Figure 8 shows that any aquifer having a coefficient of transmissibility as great as 25,000 gpd per foot could supply 2,000 gpm to a well in which there is as much as 200 feet of available drawdown. With higher transmissibility less drawdown is required.

Well yields must be tailored not only to water-use requirements but to potential effect on the source of supply. Distribution of withdrawal, as to both time and space, must be considered or even the most abundant resource will eventually prove inadequate. Well locations and pumping schedules should be arranged, consistent with economic considerations, so that interference of pumping influence remains at a minimum.

An excellent means of pumpage distribution is available in many places in the Pascagoula basin where more than one aquifer underlies a site. Batteries of wells can be located in a small area and thereby make use of two or more aquifers, provided quality of the water poses no insurmountable problem. In addition, single wells are sometimes screened in two or more separate aquifers. The latter is not always satisfactory, as differences in water level and in aquifer transmissibility favor interchange of water between aquifers to the detriment of well performance.

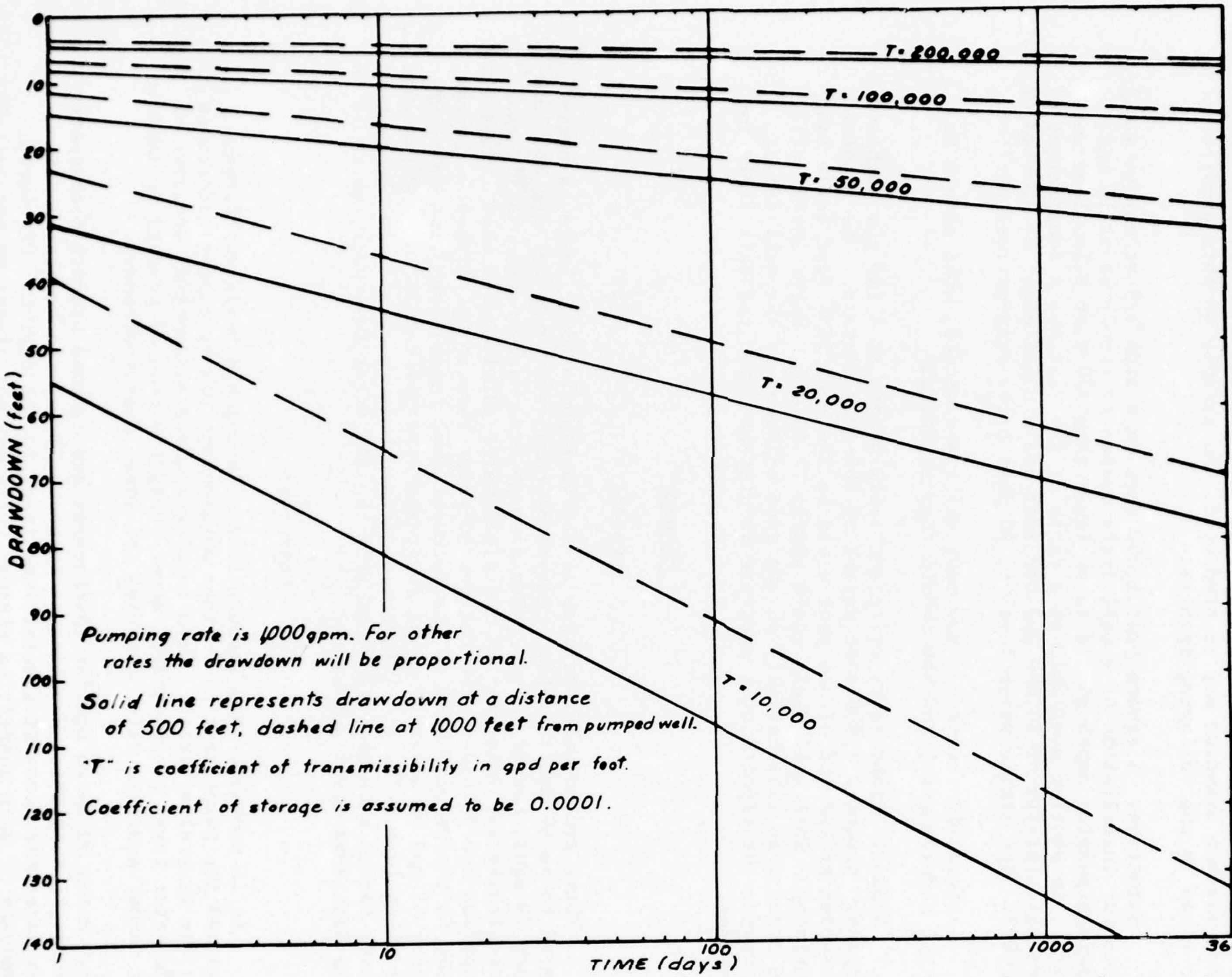

Figure 9.--Time-drawdown relations for selected aquifer characteristics in the Pascagoula River basin.

Using the graphs of figures 8 and 9, the amount of water that can be obtained in an area of a specified size and shape and with a specified maximum drawdown may be predicted. An example of this prediction is given in the following problem:

Situation: A square plot 1,000 feet on a side (23 acres) is available for installation of a well field needed to supply about 13 mgd. Maximum pumping depth should be no lower than 300 feet below land surface. An aquifer available at a depth of 500 feet has a coefficient of transmissibility of 50,000 gpd per foot and a coefficient of storage of 0.0001. The static water level is 20 feet below average land surface.

Information desired: How many wells are needed, what should be their pumping rate, and how should they be spaced?

Answer: Eight fully efficient wells pumped at 1,125 gpm each and arranged around a 1,000-foot square on 500-foot centers. The greatest drawdown at the end of one year would be 274 feet (294 feet below land surface). This well field would supply 12.95 mgd. Water levels will be drawn down substantially in the area adjacent to the well field; however, the effects will decrease as distance from the well field increases.

Pumpage

Present

Total ground-water pumpage in the Pascagoula River basin is estimated to be 60 mgd in 1965. Centers of heaviest withdrawal are Hattiesburg (9 mgd), Laurel (9 mgd), Meridian (5 mgd), and Pascagoula (11 mgd). Practically all domestic and municipal water supplies and most industrial supplies are obtained from the ground-water reservoir. A notable exception is the water supply of the International Paper Company at Escatawpa where 45 mgd of water from the Escatawpa River is delivered by a pipeline 13 miles long. The city of Mobile, although it is outside the Pascagoula River basin, uses about 100 mgd from the Big Creek Reservoir, which is in the Escatawpa River sub-basin.

Potential

It is probable that nowhere in the Pascagoula basin has pumpage reached the point that no further development can be wisely undertaken in the general vicinity. Even in places where substantial drawdown of the water level has occurred, areal redistribution of pumpage or tapping of deeper aquifers offer remedies for local overdevelopment.

Based on known aquifer thicknesses and assumed hydraulic characteristics, ground-water supplies as large as 25 mgd can be obtained in 1-square-mile areas at several localities in the region. Of course, recovery of such quantities through wells may not always be economically feasible, because of limitations on size, and therefore discharge, of individual wells and pumps.

Effects

The effect of pumpage on water levels has been covered in preceding sections, and the effect of pumpage on quality of the water is explained in the section following. However, one effect of pumpage that receives little attention, possibly because it is of a positive nature, is the diversion — toward the center of withdrawal — of ground water that would normally flow through and around the area of pumping influence. In effect, the deeper the pumping water level is lowered the farther out extends the cone of influence that funnels water toward the center of withdrawal. As the cone of influence approaches an area of recharge to the aquifer, surface water that would have been rejected by a full aquifer is received instead, enters the aquifer, and replaces the water pumped out.

Water cannot be pumped without lowering the water level. The ideal situation is one in which the lowering of pumping water levels is not excessive from a cost-of-pumping standpoint and is at the same time great enough to induce inflow from an area of substantial size — one which will insure the longevity of the well field.

Artificial Recharge

Artificial recharging of aquifers for the purposes of raising water levels, preventing salt-water encroachment, and disposing of waste water is feasible in the Pascagoula basin. In addition, "water spreading" to flush saline water from coastal terrace aquifers and for storage purposes has received some consideration in recent years. The objectives of most artificial-recharge operations are to maintain or re-establish water levels and to maintain or improve water quality. Therefore, disposal of clean waste water into aquifers and storage of water in one season for use in another season are to be encouraged in most circumstances.

Saline-Water Resources

Saline-water aquifers are used only as disposal receptacles for oil-field brine at present. Saline water in the ground should be considered as a resource. Industrial processes that can tolerate saline water are far from unknown. Advancements in desalination imply a definite potential for the resource. An obvious question of the inland water planner is "Why desalt and transport sea water, which contains about 35,000 ppm dissolved solids, when water of lower salinity is available beneath our feet?" In addition, the by-products that might be made available in desalination of ground water are potentially of value.

The contour map (fig. 10) was constructed to show the approximate elevation of the uppermost significant saline-water aquifers. It can be seen, when comparing this map with figure 3 that the saline aquifers are in general 2,000 to 4,000 feet deeper than the base of fresh water. Intervening beds consist chiefly of clay, silt, and consolidated rock.

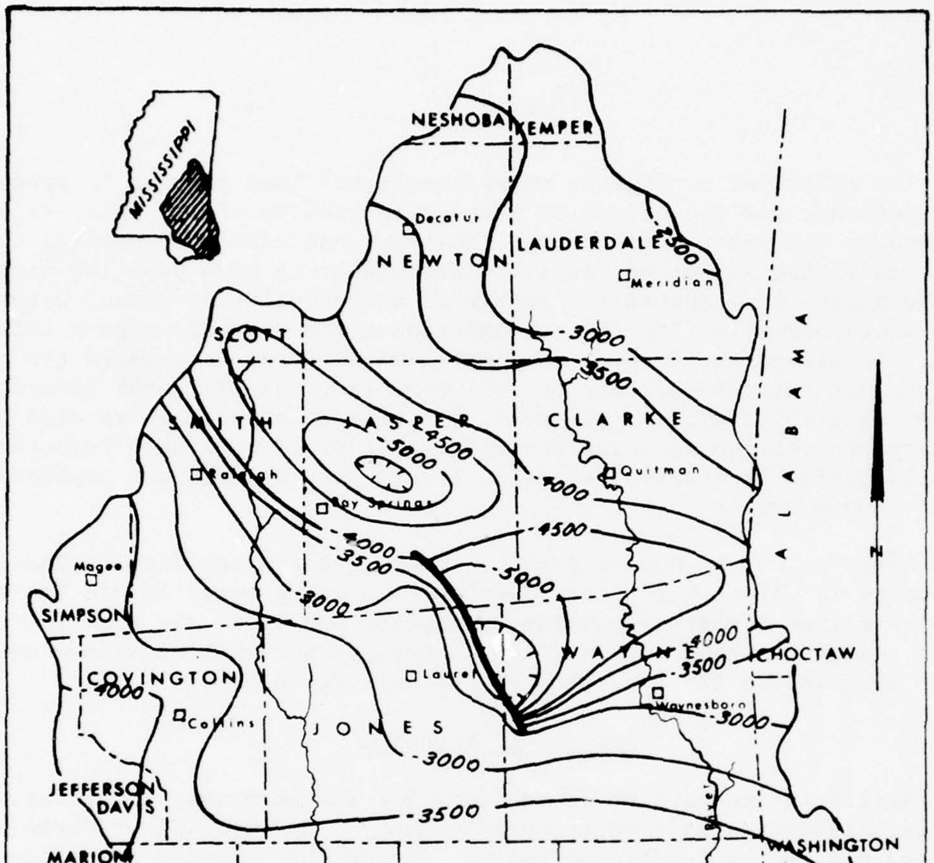

Figure 10.--Generalized contour map on the saline-water-resource zone in the Pascagoula River basin.

There are sand beds in the interval, but they are mostly thin and not considered to represent substantial sources of water.

Artesian pressure in the saline-water aquifers probably is sufficient to force the water to elevations at least 200 feet above sea level.

QUALITY OF THE WATER

Chemical Character

Ground water of good to excellent quality is available throughout the basin; however, some aquifers currently used as sources of municipal water supply yield water containing excessive concentrations of some chemical constituents. In places the near-surface aquifers contain water that is somewhat corrosive, which results in excessive concentrations of iron in the water, but deeper zones in the same localities provide satisfactory supplies. The water is chiefly a sodium bicarbonate type. It is generally soft and low to moderate in dissolved-solids concentration. The chemical analyses in tables 4 and 5 represent ground water from all parts of the Pascagoula basin (fig. 11).

The water is suitable for practically all uses, although that in the deeper aquifers usually has a percent sodium exceeding the desirable limits for irrigation water. Little treatment is applied ordinarily for municipal and industrial uses. Aeration facilities to permit the escape of carbon dioxide, and thus raise the pH, is the treatment most commonly applied. Iron removal often accompanies aeration.

Estimates of the dissolved-solids concentration in water in the deep untapped aquifers can be made where electrical resistivity of the water in the formations is recorded by electric logs. Predicted values obtained from this source are given opposite the aquifer intervals on the cross sections (pls. 2 and 3). The deepest extent of fresh water (fig. 3) is also determined in this manner.

Typically, the ground water of the basin is more highly mineralized than water in the surface streams; however, it is constant in quality and temperature, and turbidity is not a problem. Depending upon the needs of the user, ground water or surface water or a combination of the two would satisfy almost any chemical-quality requirements. A discussion of the human health aspects of the water quality is included in a Health Appendix prepared by the U. S. Public Health Service.

Salt-Water Encroachment

All the artesian aquifers contain salty water at depth. Heavy pumping that reduces artesian pressure permits the gradual updip movement of the fresh water - salt water interface. Similarly, in the tidal area

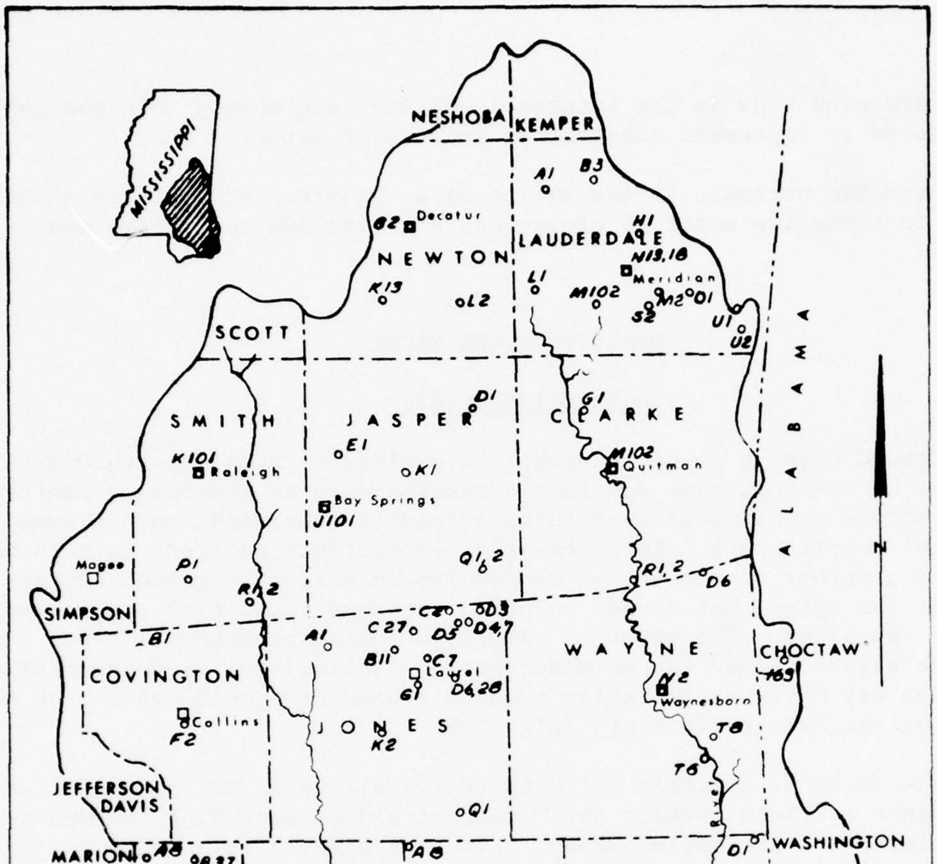

Figure 11.--Map showing location of water-sampling sites.

TABLE 4

CHEMICAL ANALYSES OF WATER FROM WELLS IN THE PASCAGOULA RIVER BASIN (MG/L)

Well No. on map	Depth (ft)	Date of analysis	Dissolved solids	pH	Silica (SiO_2)	Total iron (Fe)	Hardness as $CaCO_3$	Sodium (Na)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Analyst[a]
[b]Recommended limit (USPHS, 1962)			500			0.3				250	250	1.0	45	
						CLARKE COUNTY								
G1	411	May 1955	232	8.9	4.4	0.16	2	88	187	12	3.0	0.3	0.1	USGS
M102	209	do	224	7.5	23	.18	75	43	185	10	3.0	.2	.8	Do
R1	550	do	738	8.6	--	.28	10	294	713	3.6	7.2	--	2.2	Do
R2	200	do	451	8.2	3.6	.24	17	182	436	33	22	1.0	1.5	Do
						COVINGTON COUNTY								
B1	210	Jan. 1959	98	7.4	7.3	4.9	59	6.3	76	7.2	3.0	0.2	0.2	USGS
F2	217	Sept. 1959	40	6.8	5.5	.23	8	2.1	12	1.0	2.2	.1	.4	Do
						FORREST COUNTY								
D4	485	Feb. 1964	80	6.2	26	0.91	24	9.2	43	8.8	2.5	0.4	0.1	USGS
D5	678	do	121	7.1	12	.42	32	30	108	8.8	1.6	.2	.0	Do
D29	134	May 1964	19	5.3	20	.07	6	2.1	10	.2	2.3	.0	.1	Do
L5	525	Sept. 1964	162	7.4	30	.20	1	54	130	9.4	3.4	.4	.0	Do
M2	700-900	do	127	6.9	38	1.5	12	33	95	.6	3.2	.2	.1	Do
						GEORGE COUNTY								
B1	525	Apr. 1959	281	8.7	5.1	0.08	4	105	226	6.4	7.0	0.3	1.0	USGS
B3	185	do	221	7.4	7.7	.33	6	66	144	2.2	21	.4	.6	Do
C15	1,020	Dec. 1958	186	6.9	8.9	.10	2	56	114	8.4	18	.1	.2	Do
F14	63	Apr. 1959	26	5.4	2.3	.46	4	2.2	5	.8	3.5	.0	.6	Do
K2	93	do	112	7.6	18	.45	24	16	64	6.2	3.2	.0	.3	Do
						GREENE COUNTY								
D1	205	May 1964	41	5.8	52	11	20	2.5	25	3.2	2.7	0.0	0.1	USGS
N4	164	do	91	8.4	25	1.3	2	38	76	6.4	4.5	.4	.1	Do
P3	125±	do	111	8.1	26	.02	3	41	97	5.4	3.2	.1	.0	Do
R1	58	do	20	5.3	11	3.7	6	1.1	4	.0	3.7	.0	.6	Do
						JACKSON COUNTY								
B3	1,128	June 1959	297	8.8	3.8	0.04	6	106	236	6.6	6.2	0.5	2.1	USGS
E1	230	Dec. 1959	158	7.4	17	.18	6	44	118	6.4	2.5	.2	.6	Do
G1	416	Dec. 1958	442	8.3	4.1	.07	2	169	410	2.6	20	.7	.1	Do
G11	258	Aug. 1960	380	8.2	6.4	--	10	132	346	1.4	13	.3	.5	Do
G12	810	Sept. 1960	400	7.9	2.5	--	7	146	382	1.6	12	.8	.3	Do
K23	326	Dec. 1958	347	8.2	4.6	.26	4	131	320	3.6	18	.6	.4	Do
K41	800	do	500	8.2	6.1	.07	6	180	280	2.6	123	.4	.1	Do
K43	1,333	Oct. 1961	559	7.7	12	--	10	212	408	1.4	93	.8	.1	Do
L28	660	Nov. 1959	684	8.6	7.7	.15	6	259	576	.0	48	1.4	.8	Do
O8	217	Dec. 1958	226	7.0	19	.20	19	55	144	3.4	16	.2	.2	Do
O13	964	May 1959	772	8.7	6.9	.26	6	287	462	2.2	150	1.3	.9	Do
P14	328	Dec. 1958	405	8.2	4.0	.18	4	148	300	2.0	57	.6	.4	Do
P21	1,220	May 1959	1,120	8.5	5.5	.30	8	421	536	.2	312	1.9	1.2	Do
P41	207	May 1960	637	7.3	13	.35	42	189	244	.0	190	.6	2.2	Do
P54	829	Nov. 1958	686	8.2	6.0	.15	8	257	346	.8	200	.7	.2	Do
P62	326	May 1959	516	8.0	11	.18	10	178	324	1.0	95	1.2	1.5	Do
P84	600	June 1959	589	8.7	3.1	.00	2	221	344	.4	122	.9	.5	Do
P94	758	Apr. 1960	588	8.6	22	.07	8	192	296	.0	120	1.1	1.1	Do
P123	340	May 1959	602	7.9	13	.12	10	211	308	.6	155	.8	1.6	Do
P124	801	do	867	8.1	9.0	.16	8	306	352	1.4	275	1.1	.4	Do
P125	179	Apr. 1960	341	7.8	9.5	1.6	83	90	188	.0	91	.2	1.2	Do
Q30	255	May 1960	614	8.2	8.4	.11	14	213	412	.0	105	1.1	2.8	Do
Q32	241	Dec. 1958	657	8.2	4.7	.18	9	248	448	1.0	126	1.1	.2	Do
Q34	1,253	May 1959	1,050	8.4	5.6	.40	7	401	744	1.4	175	2.7	1.5	Do
Q42	415	do	825	8.6	5.1	.55	6	300	434	1.6	192	1.3	.7	Do
Q68	654	Dec. 1958	863	8.0	6.8	.15	8	324	360	4.6	285	.9	.4	Do
Q92	308	May 1959	532	8.0	6.0	.27	29	185	318	1.6	118	1.1	2.5	Do
Q95	156	Apr. 1960	546	7.3	8.4	1.3	66	173	232	2.6	195	.7	2.8	Do
Q101	374	Sept. 1958	605	8.1	5.3	.24	10	228	348	.8	155	1.4	.6	Do
Q104	151	Nov. 1959	524	7.9	8.2	3.6	104	138	200	1.4	185	.1	3.1	Do
Q105	840	Aug. 1959	834	7.8	7.7	--	8	305	364	.2	260	1.0	1.6	Do
Q111	357	Nov. 1958	582	8.1	7.8	.26	16	207	352	.4	128	1.2	.5	Do
						JASPER COUNTY								
D1	265	Dec. 1962	187	7.0	4.0	1.0	147	[c]15	184	17	6	0.1	--	MBH
E1	404	Aug. 1961	528	8.0	14	.1	168	[c]128	286	102	73	.1	--	Do
J101	652	May 1955	420	7.4	12	.26	14	142	230	73	40	.7	0.3	USGS
K1	341	Dec. 1962	366	7.1	4.4	.1	177	[c]70	238	71	41	.1	--	MBH
Q1	864	Apr. 1952	355	8.7	--	0	0	[c]154	348	8.2	5	.1	--	Do
Q2	360	Apr. 1955	418	8.5	11	.08	9	152	287	56	30	.1	1.1	USGS
						JONES COUNTY								
A1	46	May 1955	50	6.8	--	1.2	19	2.1	22	0.6	4.0	--	2.0	USGS
B11	120	July 1955	35	5.9	--	2.1	12	2.8	12	3.0	2.5	--	.0	Do
C2	235	May 1955	112	6.9	17	.67	37	12	62	11	3.2	--	.4	Do
C27	78	July 1955	47	6.0	--	12	18	4.3	17	8.0	3.5	--	.1	Do
C7	158	May 1955	46	6.4	--	2.4	28	2.0	34	1.0	3.0	--	.3	Do
D3	640	Apr. 1955	556	8.6	--	.32	1	218	429	49	28	2.0	2.6	Do
D4	70	May 1955	134	7.0	27	4.0	15	21	65	10	2.8	--	1.8	Do
D5	126	do	236	8.4	--	.32	43	64	194	12	4.2	--	.5	Do
D6	76	Mar. 1955	86	7.9	--	.41	46	6.2	64	6.2	4.0	--	.0	Do
D7	210	do	296	8.5	--	.17	14	110	250	19	4.2	--	1.2	Do
D28	226	do	141	7.0	35	.25	34	18	78	8.2	4.0	--	.6	Do
G1	326	Feb. 1964	183	7.7	39	.04	2	59	140	9.6	2.7	.3	.0	Do
K2	549	do	174	7.6	39	.07	9	46	112	12	2.3	.1	.0	Do
Q1	190	July 1943	120	7.3	17	.85	57	20	103	9.1	4.4	.0	.0	Do
						LAMAR COUNTY								
A8	396	Jan. 1962	62	6.2	15	6.0	22	5.5	41	0.8	1.2	0.1	0.0	USGS
A33	255	do	120	6.2	52	5.6	22	8.5	49	.6	1.3	.2	.0	Do
B37	382	Mar. 1964	47	6.7	27	.05	10	3.0	17	.0	3.2	.1	.1	Do
D10	400	Jan. 1962	126	6.8	43	8.9	33	9.4	63	.6	3.0	.1	.0	Do
D31	724	do	98	6.4	28	10	18	14	54	.6	4.1	.2	.0	Do
E13	500	do	97	6.1	42	4.9	16	8.3	30	6.0	3.9	.1	.0	Do
E26	420	Dec. 1961	27	6.1	2.0	1.2	5	6.7	12	5.6	2.9	.4	.0	Do
G14	137	Jan. 1962	47	6.4	20	8.5	5	4.1	12	.0	4.0	.0	.0	Do
H23	435	do	91	6.9	32	2.8	22	14	64	.0	3.0	.1	.0	Do

TABLE 4

CHEMICAL ANALYSES OF WATER FROM WELLS IN THE PASCAGOULA RIVER BASIN (MG/L) (Cont'd)

Well No. on map	Depth (ft)	Date of analysis	Dissolved solids	pH	Silica (SiO_2)	Total iron (Fe)	Hardness as $CaCO_3$	Sodium (Na)	Bicar-bonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Analyst[a]
						LAMAR COUNTY-Continued								
K26	90	Sept. 1961	46	3.3	4.2	1.6	18	2.3	0.00	0.2	1.0	0.4	1.0	USGS
K32	85	May 1961	14	5.5	4.6	.98	4	1.8	6	.0	2.2	.0	.6	Do
L8	35	Sept. 1961	48	5.7	5.7	.06	13	6.8	5	.6	14	.0	7.1	Do
L16	978	Feb. 1962	109	6.5	43	--	5	19	46	4.6	4.1	.2	.0	Do
L35	250	Jan. 1962	64	6.7	32	.05	6	5.5	20	.8	2.0	.2	.0	Do
N22	132	Jan. 1962	27	6.2	8.7	.21	7	3.9	14	.4	2.9	.1	.4	Do
N36	1,005	Sept. 1961	141	7.6	27	.00	0	47	122	1.4	3.0	.2	.6	Do
O17	640	Jan. 1962	185	7.7	27	1.0	10	63	169	3.8	3.0	.4	.0	Do
						LAUDERDALE COUNTY								
A1	492	Sept. 1961	149	8.3	3.6	0.1	64	[c] 36	154	3.6	4	0.2	--	MBH
B3	231	do	87	6.3	2.8	7.5+	48	[c] 2.5	50	17	5	.2	--	Do
H1	478	do	126	7.2	5.6	4.5	89	[c] 9.5	127	3.3	6	.2	--	Do
L1	280	do	229	7.9	10	Trace	134	[c] 26	173	46	5	.2	--	Do
M2	300	Oct. 1954	210	8.7	--	.08	10	78	184	5.8	2.8	--	0.7	USGS
M102	728	Sept. 1962	198	8.5	15	.02	16	62	170	5.6	4.0	.2	.0	Do
N13	296	Dec. 1955	142	6.5	--	15	55	10	78	11	3.5	--	.1	Do
N18	745	Oct. 1961	154	7.4	34	.04	90	10	132	5.6	2.2	.0	.0	Do
O1	260	Sept. 1961	174	7.8	5.2	.2	103	[c] 28	168	11	6	.1	--	MBH
S2	250	do	62	6.3	6.4	.2	35	[c] 8.0	47	6.2	5	.2	--	Do
U1	320	do	226	8.2	4.8	0	112	[c] 30	222	34	6	0	--	Do
U2	420	do	277	7.3	29	.3	199	[c] 20	232	36	8	.2	--	Do
						NEWTON COUNTY								
G2	335	Dec. 1960	102	5.9	8.8	1.0	48	[c] 16	65	19	7	0.2	--	MBH
K13	312	do	119	6.2	6.0	.5	81	[c] 13	113	6.4	6	.2	--	Do
L2	88	do	64	5.2	3.6	.2	21	[c] 13	10	16	18	.2	--	Do
						PERRY COUNTY								
A2	294	Sept. 1955	156	8.0	--	0.17	23	45	134	9.8	3.5	0.2	0.2	USGS
A8	658	Sept. 1964	144	7.2	6.4	.65	48	35	129	11	4.4	.1	.0	Do
B1	85	Sept. 1955	43	5.8	--	.04	8	2.6	8	2.4	3.0	.1	.8	Do
C8	1,192	do	60	5.7	--	.17	16	5.2	9	2.0	8.5	.2	8.8	Do
C10	728	do	157	7.4	--	2.9	4	43	111	1.6	5.0	.2	.0	Do
H14	786	May 1964	259	8.1	12	.07	2	104	201	.0	42	.4	.1	Do
J6	483	Oct. 1964	86	6.2	26	.84	22	14	51	6.8	4.0	.2	.0	Do
M21	460	May 1964	411	7.9	18	.03	7	154	148	14	148	.1	.1	Do
O3	315	Sept. 1964	160	7.8	6.6	.00	7	62	148	5.0	9.6	.2	.1	Do
						SMITH COUNTY								
K101	1,180	May 1955	220	8.4	6.0	0.12	2	80	198	11	2.0	0.1	0.4	USGS
P1	160	June 1962	--	6.4	--	1.5	22	--	53	--	2	--	--	MBH
R1	357	May 1955	121	6.6	24	1.6	9	21	50	10	2.8	.1	.1	USGS
R2	1,135	do	467	8.5	--	.21	4	173	362	30	26	--	2.4	Do
						STONE COUNTY								
B2	200	Sept. 1959	29	6.3	2.3	0.00	6	2.8	4	0.8	4.5	0.1	0.9	USGS
B3	425	do	39	6.8	2.8	.12	4	4.6	15	.2	3.8	.2	.4	Do
						WAYNE COUNTY								
D6	190	Sept. 1964	270	7.9	20	0.36	112	54	256	19	4.2	0.3	0.1	USGS
N2	110	May 1955	198	7.4	9.4	.20	129	21	180	16	6.2	.0	.3	Do
T6	650	Sept. 1964	806	7.9	7.5	.02	10	310	716	.0	67	2.9	.2	Do
T8	125	Nov. 1956	40	5.5	3.3	5.0	4	5.5	12	.0	4.0	--	--	Curtis Lab.
						CHOCTAW COUNTY, ALA.								
163	108	Sept. 1948	--	--	--	--	13	--	10	1.0	5.0	0.0	16	USGS
						MOBILE COUNTY, ALA.								
20	61	Aug. 1954	40	5.5	--	--	12	--	4	--	6	--	--	USGS
21	110	do	22	5.8	--	--	8	--	9	--	5.5	--	--	Do
22	735	do	152	8.1	15	0.11	1	49	125	3.2	11	0.2	0.4	Do
70	212	do	41	6.2	--	--	7	--	36	--	3.0	--	--	Do
96	65	Jan. 1947	--	--	--	--	12	--	4	3	8	--	3.2	Do
						WASHINGTON COUNTY, ALA.								
19	256	Jan. 1947	--	--	--	--	57	--	79	6	4	--	0.1	USGS
29	147	do	--	--	--	--	12	--	109	2	8	--	.1	Do

[a] USGS is U. S. Geological Survey; MBH is Mississippi Board of Health.

[b] Public Health Service Drinking Water Standards, 1962.

[c] Sodium and potassium, reported as sodium.

TABLE 5

ANALYSES OF SELECTED CONSTITUENTS AND PROPERITIES OF DRINKING WATER SUPPLIES IN PASCAGOULA RIVER BASIN, FEB. 1967

(MG/L)

County	Community	Well number: Owner	Well number: USGS	Well depth (ft)	Cadmium	Barium	Beryllium	Lead	Chromium	Manganese	Iron	Nickel	Molybdenum	Vanadium	Copper	Zinc
Recommended maximum limit										0.05	0.3				1.0	5.0
Maximum permissible limit					0.01	1.0		0.05	0.05							
Clarke	Quitman	3	M103	289	[a]<0.008	0.006	<0.00004	<0.016	<0.004	0.0072	0.040	<0.008	<0.016	<0.016	<0.004	<0.008
Covington	Collins	2	F2	217	<.003	.112	.0001	<.006	<.001	.0028	.005	<.003	<.006	<.006	.049	.013
Forrest	Hattiesburg	1	D4	485	<.003	.031	<.00007	<.007	<.002	.042	.680	<.003	.010	<.007	.003	.031
	do.	4	D7	688	<.007	.033	<.00003	<.013	<.003	.0197	.204	<.007	<.013	<.013	<.003	.016
George	Lucedale	2	C17	1,000	<.008	.005	<.00004	<.016	<.004	.0072	.640	<.008	<.016	<.016	<.004	<.008
Greene	Leakesville	3	P2	125	<.006	.008	<.00003	<.012	<.003	.0046	.008	<.006	<.012	<.012	.174	.037
Greene	State Line	--	D1	205	<.002	.084	.00006	<.005	<.001	.050	.360	<.002	.012	<.005	.001	.007
Jackson	Pascagoula	3	P124	801	<.053	.011	<.00026	<.106	<.027	<.027	<.027	<.053	<.106	.222	.032	<.053
Jasper	Bay Springs	4	J7	1,008	<.014	.007	<.00007	<.028	<.007	<.007	.039	<.014	<.028	.059	<.007	<.014
Jones	Laurel	5	C34	383	<.005	.018	<.00003	<.011	<.003	.015	.029	<.005	<.011	<.011	<.003	<.005
Lamar	Purvis	2	L16	984	<.004	.026	<.00002	<.008	<.002	.020	.095	<.004	<.008	<.008	.002	<.004
Lauderdale	Collinsville	1	A2	692	<.006	.068	<.00003	.017	.010	.102	1.140	.011	<.011	.014	.003	<.006
Newton	Newton	1	K13	312	<.007	.018	<.00004	.022	<.004	.038	.096	<.007	<.015	.026	<.004	<.007
Perry	New Augusta	1,2	[b]H6,H7	720	<.016	.019	.00008	<.032	<.008	<.008	<.008	<.016	<.032	<.032	<.008	<.016
Simpson	Magee	--	Q1	112	<.004	.042	.00011	.010	<.002	.072	.006	<.004	<.008	.014	.004	.033
Smith	Raleigh	New	K2	1,160	<.012	<.001	<.00006	<.023	<.006	<.0058	<.046	<.012	<.023	<.023	.028	<.012
Stone	Wiggins	1	B2	200	<.003	.015	<.00001	.023	<.001	.0038	.008	<.003	<.005	<.005	.022	.025
	do.	3	B9	954	<.008	.006	<.00004	<.016	<.004	.0288	.017	<.008	<.016	<.016	<.004	<.008
Wayne	Waynesboro	3	N6	118	<.011	.067	<.00005	<.021	<.005	.0116	.011	<.011	.084	<.021	<.005	<.011

County	Community	Well number: Owner	Well number: USGS	Well depth (ft)	Cobalt	Silver	[c]A.B.S.	Arsenic	Selenium	Boron	Fluoride	Aluminum	Cyanide	pH	Phosphorous	Strontium
Recommended maximum limit							0.05	0.01			1.0		0.01			
Maximum permissible limit						0.05		.05			1.6		.2			
Clarke	Quitman	3	M103	289	<0.008	<0.0008	<0.03		<0.002	0.029	0.11	<0.016		8.1	<0.032	0.138
Covington	Collins	2	F2	217	<.003	<.0003	<.03		<.002	.015	.26	<.006		7.8	<.011	.018
Forrest	Hattiesburg	1	D4	485	<.003	<.0003	<.03		<.002	.032	<.06	<.007		7.7	<.014	.061
	do.	4	D7	688	<.007	<.0007	<.03		<.002	.051	.2	<.013		8.2	<.027	.121
George	Lucedale	2	C17	1,000	<.008	<.0008	<.03		<.002	.088	.14	1.600		7.9	<.032	.014
Greene	Leakesville	3	P2	125	<.006	<.0006	<.03		<.002	.041	.08	<.012		8.2	<.028	.015
Greene	State Line	--	D1	205	<.002	<.0002	<.03		<.002	.020	.08	<.005		7.4	<.024	.031
Jackson	Pascagoula	3	P124	801	<.053	<.0053	.06	All samples < 0.01	<.002	1.165	.84	<.106	All samples < 0.005	8.1	<.212	.011
Jasper	Bay Springs	4	J7	1,008	<.014	<.0014	<.03		<.002	.112	.12	<.028		8.0	<.056	.095
Jones	Laurel	5	C34	383	<.005	<.0005	<.03		.002	.034	.12	<.011		7.9	<.022	.041
Lamar	Purvis	2	L16	984	<.004	<.0004	<.03		<.002	.025	.14	<.008		7.6	<.015	.026
Lauderdale	Collinsville	1	A2	692	.011	.0029	<.03		<.002	.035	.12	<.011		8.0	<.025	.131
Newton	Newton	1	K13	312	<.007	<.0007	<.03		<.002	.019	.12	<.015		8.2	<.030	.132
Perry	New Augusta	1,2	H6,H7	720	<.016	<.0016	<.03		<.002	.368	.48	<.032		8.1	<.064	<.002
Simpson	Magee	--	Q1	112	<.004	<.0004	<.03		<.002	.016	<.06	.008		6.7	<.015	.048
Smith	Raleigh	New	K2	1,160	<.012	<.0012	<.03		<.002	.100	.16	<.023		8.2	<.046	<.001
Stone	Wiggins	1	B2	200	<.003	<.0003	<.03		<.002	.009	<.06	<.005		6.4	<.010	.005
	do.	3	B9	954	<.008	<.0008	<.03		<.002	.120	.26	<.016		7.8	.080	.036
Wayne	Waynesboro	3	N6	118	<.011	<.0011	<.03		<.002	.096	.22	<.021		8.1	<.042	.263

[a] < means "less than value" when accuracy of instrument or method is limited.

[b] Composite, finished water sample.

[c] Alkyl benzene sulforate.

near the coast heavy pumping from water-table aquifers in the surface deposits would induce inflow of brackish water from the estuarine streams.

Other causes of salt-water contamination of aquifers are disposal of industrial wastes by injection into fresh-water zones and incomplete plugging of wells that enter the salt-water zone and permit the upward flow of water from that zone.

Salt-water encroachment has become noticeable in a few places along the Gulf Coast (Lang and Newcome, 1964). The Pascagoula Formation now yields water of marginal quality to some wells in Pascagoula. Chloride concentrations in water from wells screened in the Graham Ferry Formation in the Pascagoula area generally exceed 100 ppm (Newcome and Golden, 1964), but the rate of encroachment is very slow, and in some monitor wells no increase in chloride content has been observed in the 5 years preceding this report.

Water Temperature

Ground water in shallow aquifers (50- to 150-foot depths) in the Pascagoula basin has a temperature of about 66°F. From this the temperature rises 1°F for every 55 feet increase in depth. The measured temperature of the discharge from a 1,200-foot well at Gulfport was 86°. Farther west, in Hancock County, the temperature of water from 1,875 feet was 100°.

Accurate aquifer-temperature measurements are difficult to obtain. It has been found that the temperature of water from deep wells can be measured reliably at the surface only if the flow or pump yield is sufficient to overcome the cooling effect of lower temperatures at shallow depth outside the wells. Discharges of 100 gpm or more are desirable to insure representative aquifer-temperature data.

Ground-water temperature is constant the year around. The resource thus can be used for either cooling or heating purposes, as well as constant-temperature processes.

CONCLUSIONS

Abundant ground-water resources underlie the Pascagoula River basin. Present water-supply developments tap only a small fraction of the quantity available to wells. Efficient use of the resource requires (1) tapping of thick aquifers deeper than present wells, (2) construction of large-capacity, efficient wells, and (3) proper spacing of wells to avoid excessive interference.

With careful programs of exploration and development, it should be possible to obtain water supplies as great as 25 mgd in many localities. Individual well yields of 2,000 gpm could become commonplace, and yields of 5,000 gpm are not unreasonable to expect in some places.

Quality of the ground water is adequate for practically all uses, although suitable supplies for irrigation will not be as readily obtainable as those for other purposes, because of the natural predominance of water of a sodium bicarbonate type.

In the interest of optimum development of the ground-water resources, as well as their conservation, it is desirable that the potential effects of engineering works on the ground-water reservoirs be evaluated. The extent of manmade effects ordinarily can be determined only by detailed studies of the hydrologic environment in the localities concerned.

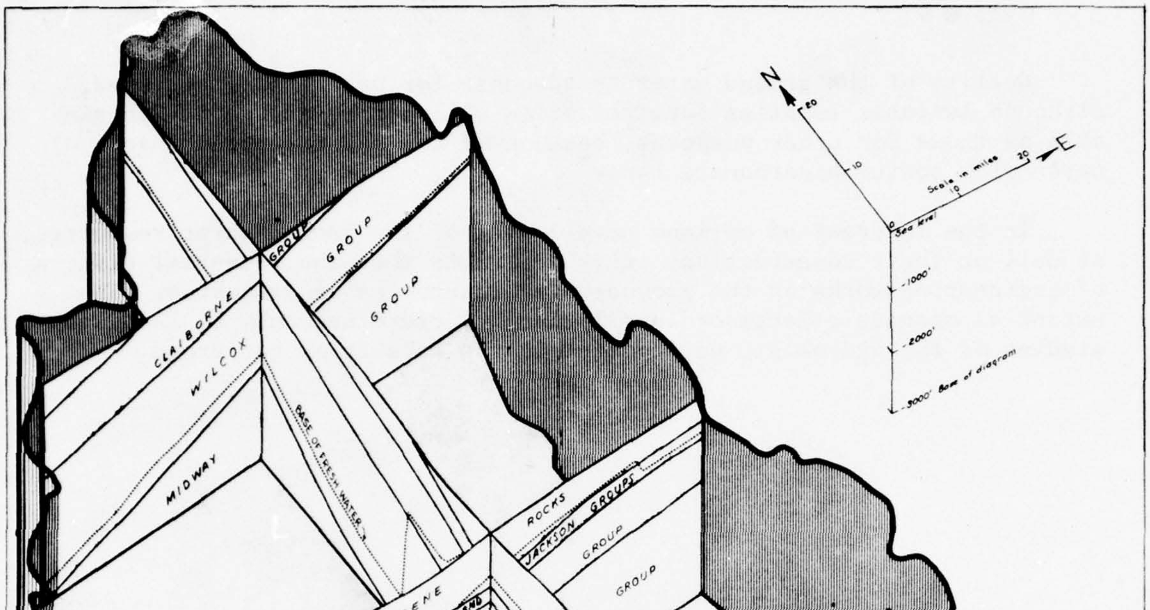

Plate 1.-- Perspective diagram of the Pascagoula River Basin

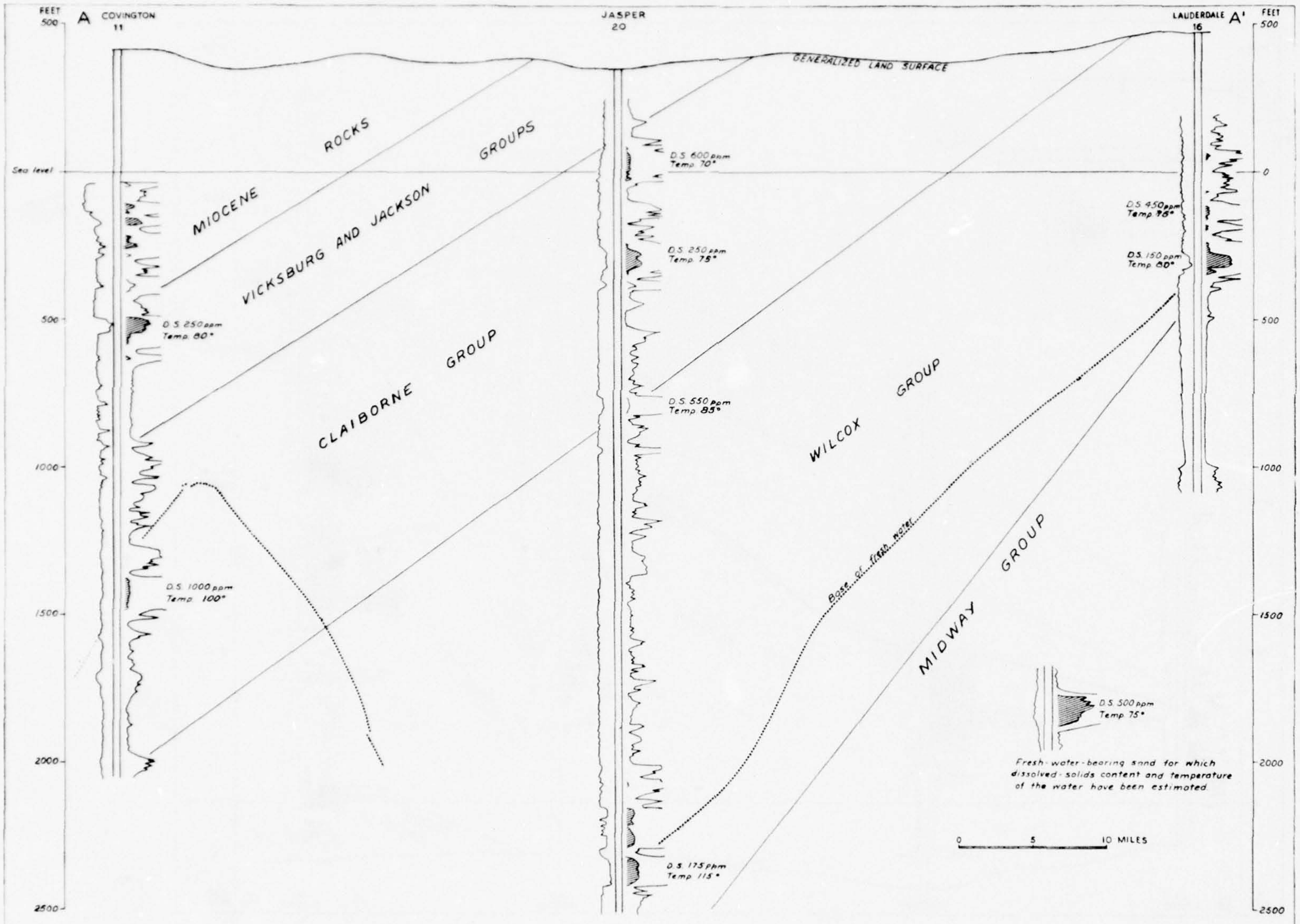

Plate 2.--Electric-log cross section A-A' from near Collins to near Meridian, Miss.

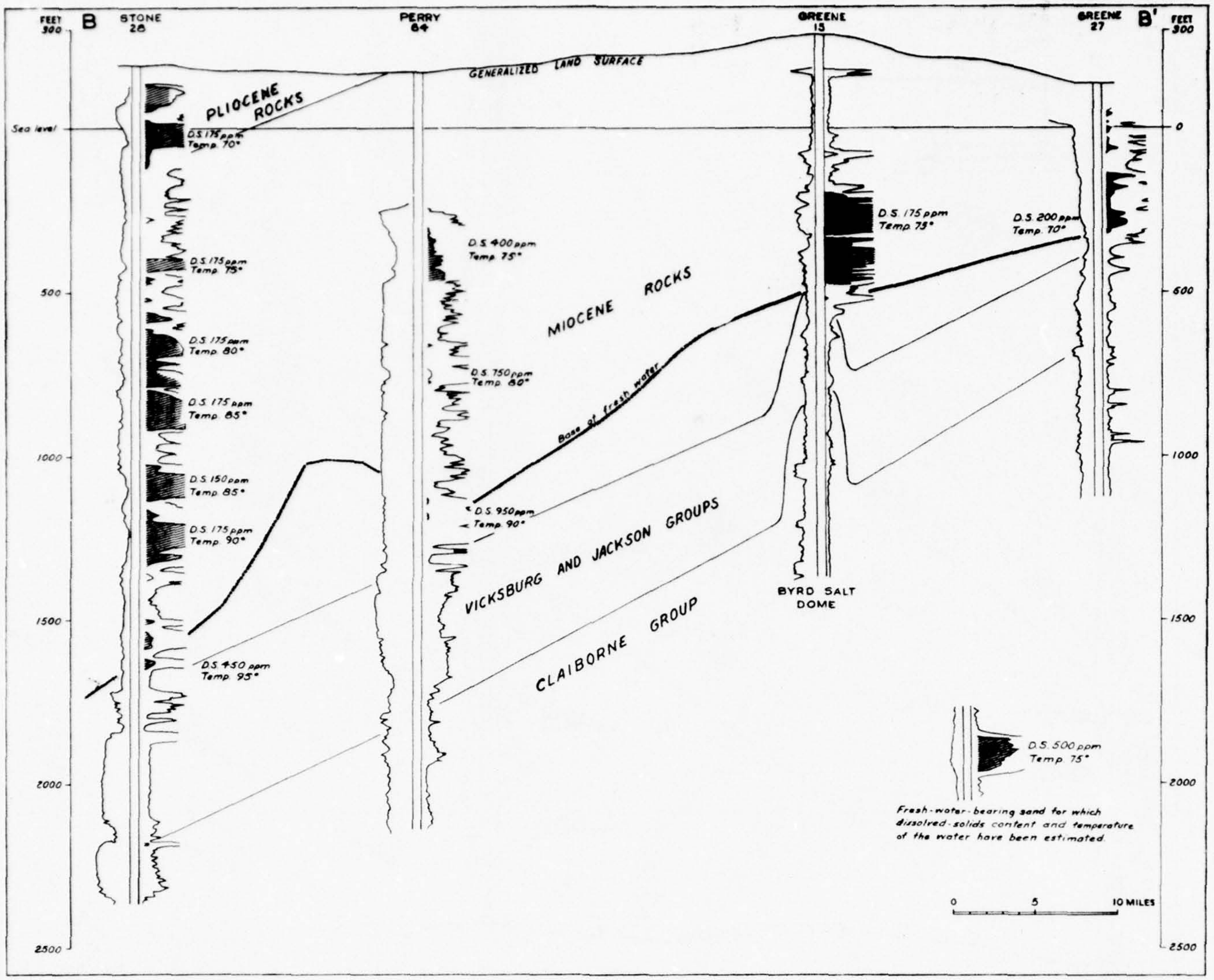

Plate 3.- - Electric-log cross section B-B' from near Wiggins to northeastern Greene County, Miss.

PASCAGOULA RIVER COMPREHENSIVE BASIN STUDY

APPENDIX L

MINERAL RESOURCES AND INDUSTRY OF THE PASCAGOULA RIVER BASIN, MISSISSIPPI AND ALABAMA

by

Robert H. Arndt

Prepared by U.S. Department of the Interior
Bureau of Mines, Area IV Mineral Resource Office
Bartlesville, Oklahoma, as a contribution to the
Pascagoula River Comprehensive Basin Study

MINERAL RESOURCES AND INDUSTRY
OF THE PASCAGOULA RIVER BASIN,
MISSISSIPPI AND ALABAMA

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MINERAL RESOURCES AND INDUSTRY
OF THE PASCAGOULA RIVER BASIN,
MISSISSIPPI AND ALABAMA

by

Robert H. Arndt[1/]

INTRODUCTION

The Pascagoula River Basin is an area of 9,700 square miles, including all or part of 22 counties in southeastern Mississippi and 3 counties in southwestern Alabama. All the area drained by the Pascagoula and its main headwater streams, the Leaf and Chickasawhay Rivers, and all their tributaries comprise the basin. Collectively, the basin streams rise inland, flow southward, and drain into the Mississippi Sound through the Pascagoula River.

The overall objective of the comprehensive basin study is to determine the needs for land and water resources conservation and development in relation to the existing and future economy of the basin. This study by the Bureau of Mines is supplemental to the Economic Base Study (3)[2/] and to studies of navigation needs. The objective is to inventory the nature and extent of mineral resources and industry in the basin, both current and in the projected future.

The minerals and mineral products discussed in this report are primary ores and derived products normally tabulated by the Bureau of Mines and summarized annually in Minerals Yearbook. Compiled data pertain to the Pascagoula River drainage basin only, unless otherwise specified.

PHYSICAL CHARACTERISTICS OF THE BASIN

The Pascagoula River drainage basin is about 164 miles long from the northern tip in Kemper County to the southernmost tip on Mississippi Sound in Jackson County (Fig. 1). Maximum breadth is about 85 miles east to west from Choctaw County, Ala., to Simpson County, Miss.

1/ Geologist. Area IV Mineral Resource Office, Bureau of Mines, U. S. Department of the Interior, Bartlesville, Okla.

2/ Underlined numbers in parentheses refer to items in the list of references at the end of this report.

Work completed February 8, 1967.

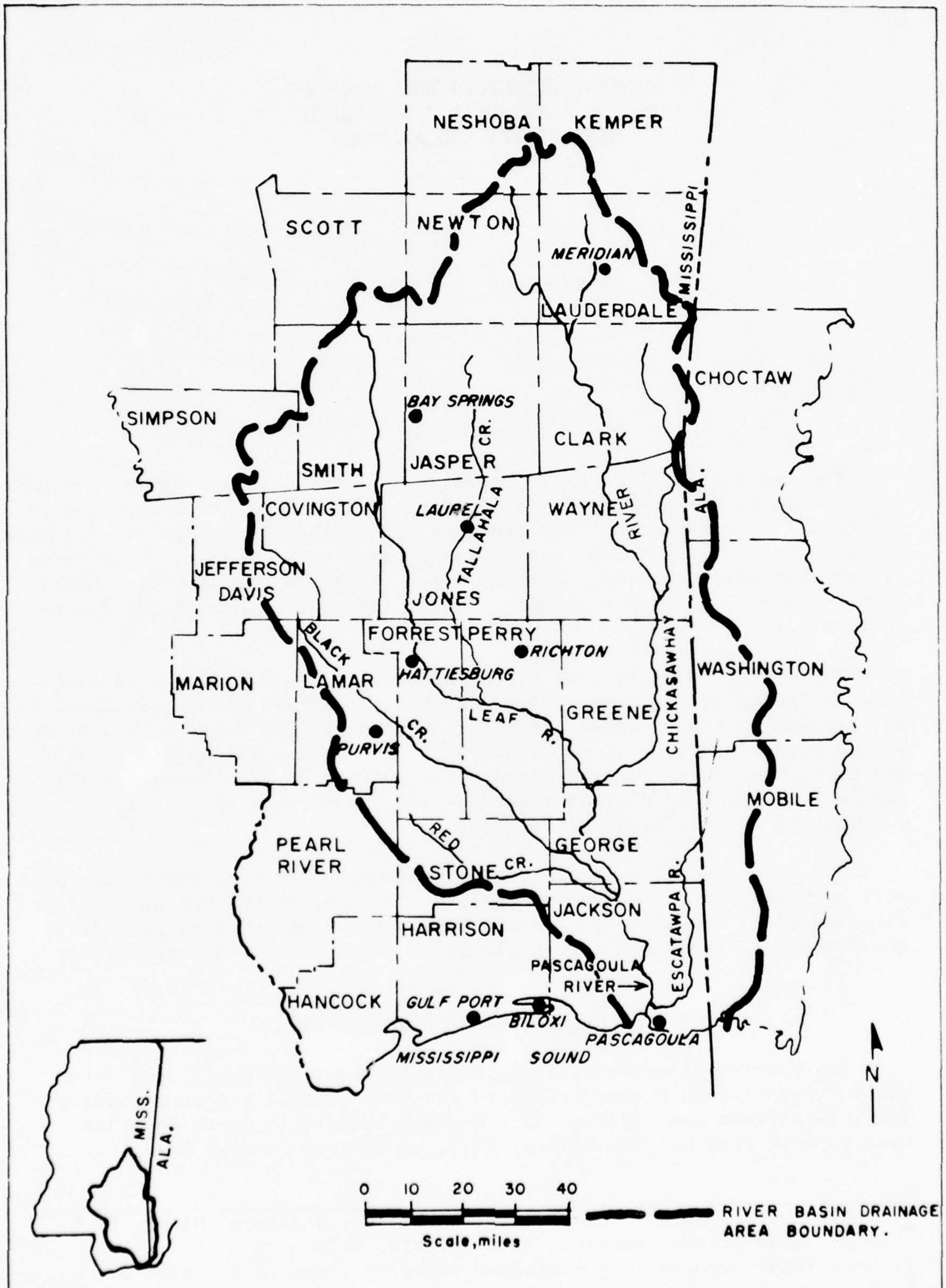

FIGURE 1.-Pascagoula River Drainage Basin.

All of Jasper, Covington, Jones, Forrest, Perry, Greene, and George Counties; most of Lauderdale, Newton, Smith, Clarke, Wayne, Lamar, Stone, and Jackson Counties; small portions of Kemper, Neshoba, Scott, Simpson, Jefferson Davis, Marion, and Pearl River Counties, Miss.; and parts of Choctaw, Washington, and Mobile Counties, Ala., lie within the drainage basin of the Pascagoula River.

Physiography

Parts of four physiographic regions cross the Pascagoula River drainage basin from east to west or west-northwest (20). The southern third of Jackson County lies in the Coastal Pine Meadows. Northward from the Coastal Pine Meadows to southern Smith and Jasper Counties and northern Wayne County, the Long Leaf Pine Hills cross the basin. A narrow zone trending west-northwest across Payne, Clarke, Jasper, and Scott Counties is part of the Jackson Prairie. North of Jackson Prairie, the basin lies within the North Central Plateau.

Gently rolling topography, rarely rising to more than 50 feet above sea level, is typical of the Coastal Pine Meadows as far as 30 miles north of the gulf coast. Swamps and marshes, as well as stabilized sand dunes, are common near the coast. Streams flow sluggishly as a consequence of low gradients.

Land surfaces in the Long Leaf Pine Hills slope from about 400 feet elevation in the north to less than 100 feet in the south. The surface is maturely dissected and rough, but has local remnants of gently rolling surfaces. Larger streams flow on alluvium in relatively broad valleys. Terraces are present on many of the gentle valley slopes.

Gently rolling topography, originally with numerous open prairies scattered among level wooded lands, typify the Jackson Prairie. Along its southern edge, outcrops of erosion-resistant sandstone provide more hilly terrain. The belt is about 10 miles wide in the Pascagoula River drainage basin.

The North Central Plateau has a variety of topography including rolling, rough, hilly, and plateau. Elevations are well above 400 feet locally. Stream bottoms are commonly wide and contain alluvium. Alluvial terraces occupy many valley slopes.

Geology

Surface rocks of the Pascagoula River Basin are all of Cenozoic age (24) (Table 1). Eocene strata are exposed in the northern third of the basin within the North Central Plateau.

Table 1

Stratigraphic terminology

Generalized section of the formations in Mississippi (29)			Additional units in text (stratigraphic position approximate)		
Age		Formation	Age	Group	Formation
	Miocene and younger		Quaternary Recent Pleistocene Pliocene Miocene		Alluvium Terrace deposits Citronelle Graham Ferry Pascagoula Hattiesburg Catahoula
	Oligocene			Vicksburg	
	Upper Eocene	Jackson		Jackson or Yazoo	
Cenozoic	Middle Eocene	Yegua Cook Mtn.-Wautubbee Sparta-Kosciusko Cane R.-Winona Tallahatta		Claiborne	Cockfield Zilpha
	Lower Eocene	Hatchetigbee Bashi Tuscahoma Nanafalia		Wilcox	Fearn Springs
	Paleocene	Naheola Matthews Landing Porters Creek Clayton		Midway	
	Upper Cretaceous	Ripley-Selma Eutaw-Eagle Ford Tuscaloosa			Prairie Bluff Chalk Selma Chalk
Mesozoic	Lower Cretaceous	Dantzler Fredericksburg Paluxy Glen Rose Hosston		Washita Fredericksburg	Mooringsport Ferry Lake Anhydrite Rodessa Pine Island Shale Sligo
	Upper Jurassic	Cotton Valley Buckner Smackover Louann Eagle Mills			

Strata of the Yazoo or Jackson Group (Eocene) and overlying Vicksburg Group (Oligocene) crop out in the Jackson Prairie. Catahoula, Hattiesburg and Pascagoula Formations (Miocene) are exposed throughout the Long Leaf Pine Hills. Undifferentiated Pliocene and Quaternary sediments extend throughout the Coastal Pine Meadows. Unconsolidated Citronelle sediments of (Pliocene--Pleistocene?) age cap the interstream divides in the western and southern parts of the Long Leaf Pine Hills and northern part of the Coastal Pine Meadows. Scattered remnants of the Citronelle exist locally in the Jackson Prairie.

Quaternary and Recent alluvium fill many riverbottoms and are remnant terraces on the valley slopes.

The subsurface contains Cretaceous and Jurassic strata, some of which are equivalent to strata exposed in northeastern Mississippi. Others are known only through oil well drilling and seismic surveying.

Surface strata dip gently in a southerly and southwesterly direction and crop out in west-northwest-trending bands parallel to the physiographic divisions. Locally, folds and faults modify the regional dips of the strata.

A major fold structure, the East Mississippi syncline (26), interrupts the regional dip of the subsurface strata. The trough curves gently from east to west through Greene, Perry, and Forrest Counties, and opens westerly into the broader Mississippi salt basin of the central southwestern part of the State.

MINERAL RESOURCES AND INDUSTRY

Summary

Production of crude oil, natural gas, and natural gas liquids (Table 2) generated most of the value of mineral output in the Pascagoula River drainage basin in 1965. Sand, gravel, and clay provided the only significant tonnage and value of solid mineral substances recovered from primary deposits. Items whose individual value cannot be revealed are lime and magnesium compounds manufactured from dolomite obtained outside the drainage basin, and sulfur recovered from refinery gases in a refinery in Lamar County.

Stated quantities and values represent the cooperation of mineral producers who voluntarily reported the value and amount of their products. American Sand and Gravel Co., Hattiesburg; W. S. Dickey Clay Co., Meridian; and Laurel Brick & Tile Co., Inc., Laurel, provided considerable information for use in this report.

The following discussion treats the output and value of individual substances wherever possible for the period 1956-65. Source, extent of

resources, and future outlook are considered. Iron and bauxite are discussed, although their source is outside the drainage basin, in order to evaluate their possible future significance in the mineral industry of the basin.

Salt and lignite present in the drainage basin but not now produced are similarly considered.

Table 2

Mineral production in the Pascagoula River drainage basin, 1965

Commodity	Quantity	Value (thousands)
Clay--------------------------------short tons--	126,445	$604
Natural gas-----------------million cubic feet--	1/49,415	8,457
Natural gas liquids-----------thousand gallons--	10,058	536
Petroleum (crude)---thousand 42-gallon barrels--	1/27,594	72,667
Sand and gravel------------thousand short tons--	1,308	1,269
Stone---------------------------------do--------	12	24
Value of items that cannot be disclosed:		
Certain nonmetals--------------------------	-----------	4,339
Total------------------------------------	-----------	87,896

1/ Calculated in part from Mississippi State Oil & Gas Board Bull. (25)

Bauxite

No bauxite has been mined within the Pascagoula River drainage basin. About 400 tons of bauxite was mined from Midway strata in northern Kemper County during World War II. Morse (27, p. 174) estimated the deposit contained approximately 1,500 tons of bauxite. Attempts by the Bureau of Mines (30) to extend the deposit by exploratory drilling in adjacent sections were unsuccessful.

Strata equivalent to those bearing the bauxite cross Kemper County from the north-central part to the southeast corner and lie outside the Pascagoula River drainage basin. The deposit of bauxite in Kemper County is the southernmost of a series of similar deposits that have been found in similar strata northward into Tippah County, just south of the Tennessee-Mississippi boundary. There is no evidence that the deposit extends into the Pascagoula River drainage basin.

Whereas the deposit has no appreciable commercial value, Mellen (22, p. 85) called attention to large quantities of highly aluminous kaolin and anauxite associated with the bauxite. Such substances have potential value in the manufacture of cement and ferrosilicon, and as a source of aluminum.

Clay

Clay is the third most important mineral product in the Pascagoula River drainage basin. In 1965, 126,445 tons of clay, including fire clay, bentonite, and miscellaneous clay for the manufacture of structural items, was mined in the area. The total value was $604,311. Output and value of clay since 1956 are shown in Table 3.

Table 3

Clay output and value, Pascagoula River Basin, 1956-65 1/

Year	Output (short tons)	Value (dollars)
1956-------------	91,494	341,194
1957-------------	101,744	382,244
1958-------------	91,672	295,172
1959-------------	75,172	251,172
1960-------------	100,382	620,132
1961-------------	93,033	623,703
1962-------------	116,379	827,910
1963-------------	160,703	824,484
1964-------------	124,708	623,155
1965-------------	126,445	604,311
Total-------	1,081,732	5,393,477

1/ Forrest, Jasper, Jones, Lauderdale, and Smith Counties.

Miscellaneous clay mined in Forrest, Jones, and Lauderdale Counties was used primarily in the manufacture of brick and tile. Fire clay was mined in Lauderdale and Smith Counties. Bentonite mined in Smith County was processed at a plant in Jackson, Hinds County, principally for use as a bleaching agent for animal, vegetable, and mineral oils.

Clays in the Fearn Springs, Bashi, and Hatchetigbee Formations of the Wilcox Group are mined extensively near Meridian in central and northeastern Lauderdale County. Foster and McCutcheon (11, pp. 174-177) found that the Fearn Springs contains cream- to buff-burning kaolinitic clay, cream- to buff-burning pottery clays, and cream-, buff-, and gray-burning bond clays, as well as buff- to red- and brown-burning brick and tile clays. Their conclusion that the clays of the Bashi and Hatchetigbee Formations are not of commercial value has been subsequently refuted. Outcrops of the Wilcox Group extend northwesterly into Kemper and Neshoba Counties and southeastward into Alabama.

Bentonite deposits of Smith County are a part of the Vicksburg Group of Oligocene age. The Vicksburg strata in the Pascagoula River drainage

basin crop out in an irregular belt from northwestern Smith County, east-southeastward across Smith, Jasper, northeastern Jones, southwestern Clarke, and northern Wayne Counties, and into Alabama. Deposits of bentonite in northwestern Smith County (4, pp. 49-55) have a maximum average thickness of about 4 feet, local thickness of 6 feet, and overburden of as much as 25 feet. Bay (4, p. 56) described a deposit 14 feet thick in northern Wayne County. Bentonites in northwestern Smith County have been mined in preference to those located to the southeast because they have superior bleaching qualities.

Surface clays are utilized at Hattiesburg and Laurel for the manufacture of brick. They include the weathered residue of the Hattiesburg Clay of Miocene age and alluvium at Hattiesburg. The Catahoula Sandstone formation of Miocene age crops out in the vicinity of Laurel.

Studies of clays in Mississippi have shown bloating properties of the Wilcox and Midway strata in Lauderdale County (11) and of the Claiborne and Yazoo Groups in Scott County (5). Foster and McCutcheon (12) found that numerous samples of Hattiesburg Clay from Forrest County bloated in the course of firing tests. Even such materials as loess and alluvium (23) exhibit bloating properties in samples from other parts of the State. More recently bloating qualities of clays were tested by the Mississippi Geological, Economic, and Topographical Survey in cooperation with the Mississippi Industrial and Technological Research Commission (28). A sample of Porters Creek Clay from the Midway Group in southeastern Kemper County exhibited excellent bloating properties, good rotary kiln processing properties, excellent soundness and abrasion resistance, and unusually high strength when used as an aggregate in concrete. Seven other samples, including clay from the Yazoo Group in Clarke County, individual samples of Hattiesburg Clay from Forrest and Lamar Counties, Graham Ferry Clay from Pearl River and Stone Counties, and Pascagoula Clay from Pearl River County exhibited essentially no bloating properties and were considered unfavorable for the manufacture of lightweight aggregate.

The potential value of Midway and Yazoo Clays for manufacturing lightweight aggregate appears to be confirmed by the 1941 and 1964 testing programs. The contradictory results of the 1941 and 1964 tests of Hattiesburg Clay illustrate clearly the necessity for sampling prospective clay sources and testing suitability of Hattiesburg Clay before attempting manufacture of lightweight aggregate.

Some concern exists over the quantity of bentonite reserves. Bay (4) estimated one of the deposits in Smith County contained about 650,000 tons of high-grade bentonite. Estimated total original resources in deposits in Smith County, described by Bay, is 2.2 million short tons. Mining since 1939 has probably reduced the reserves appreciably.

Strata of the Jackson Group that extend across the Pascagoula River drainage basin from central Scott County to southeastern Clarke County and northeastern Wayne County also contain some bentonitic or bentonite-like

materials. At one locality in eastern Wayne County, beds of sub-bentonite 20 and 17 feet thick are separated by 20 feet of marl. Unfortunately, the oil-bleaching properties of the Jackson bentonites are relatively poor (4, p. 45).

Outlook

Clay being an extremely common and abundant mineral substance and of low value, is generally marketed near its source. Special light-burning clays or highly refractory clays, such as those used in the manufacture of china and stoneware, and refractory brick may be of sufficient value to warrant their shipment elsewhere for utilization. It is to be expected, therefore, that the clay industry of the Pascagoula River drainage basin, producing mostly brick and sewer tile, will grow or shrink in response to local demand.

By contrast, the demand for bentonite as a bleaching agent in the processing of oils is dependent on regional and national needs rather than on local needs. Providing additional resources can be found, the bentonite industry of the Pascagoula River Basin may be expected to expand independently of the local economic development of the basin.

The development of a lightweight aggregate industry in the Pascagoula River Basin hinges in part on the supply of suitable natural aggregate for concrete construction work and the relative cost of obtaining natural and lightweight aggregate. The discussion on sand and gravel has pointed out the difficulty of winning coarse aggregate and the considerable rejection of fine materials that accompanies all recovery of gravel. The time may come when it is feasible to substitute lightweight aggregate for certain gravel and other aggregate uses.

Iron

Iron deposits are found in the Porters Creek-Naheola Formations of the Midway Group, in the Wilcox Group, and in the Winona-Zilpha Formations of the Claiborne Group in Mississippi. A deposit in the Portersville area, southeastern Kemper County, is the only one associated with the Pascagoula River Basin, although it actually lies outside the basin drainage area.

At Porterville, the iron is concentrated in nodular masses of siderite (iron carbonate) and concretionsof limonite, much of which has been developed concentrically around a core of siderite. The matrix for the concretions and nodules is glauconite, and sandy and silty clay situated between typical Porters Creek and Naheola clays. Two limonite zones have a combined thickness of 5 to 6 feet (17, p. 29). Analyses revealed as much as 53.21 percent iron, 1.40 percent manganese, not more than 4.3 percent phosphorus, and as much as 11.57 percent insoluble matter. Because of the discrete nature of the iron-bearing nodules and concretions, sand and clay are easily washed from the ore. The iron deposits in the

Porterville area were mined during 1965 and 1966. No deposits of iron have been described in the Wilcox Group nor in the Claiborne Group within the environs of the Pascagoula River drainage basin.

The potential production of iron ore from these deposits is considered to be small. However, some carbonate ores are useful as pigmenting materials and should tests prove satisfactory and market be sufficient, the deposits could be mined for pigment.

Lignite

Numerous beds of lignite have been reported in the Wilcox strata of northeastern Lauderdale (11) and southeastern Kemper Counties (14). The beds are relatively thin, the majority being not more than 3 feet thick with a maximum reported thickness of 6.1 feet. Foster and McCutcheon (11) found that 36 out of 58 beds of lignite measured in drill holes in Lauderdale County were less than two feet thick and only nine were more than three feet thick. Average depth to beds was about 22 feet.

Apparently the lignite has not been used for any other than domestic or smithy fuel purpose. Not all is combustible, for some of it is highly weathered and some is merely lignitic clay.

Petroleum

The value of crude oil, natural gas, and natural gas liquids produced in Mississippi in 1965 was $179.9 million or 86 percent of the $209 million value of Mississippi minerals in that year. Crude oil produced in the Mississippi part of the Pascagoula River drainage basin amounted to 36 percent of all the oil produced in the State, whereas natural gas amounted to 29.6 percent and natural gas liquids amounted to 20.6 percent of the State's respective products.

The total product in the drainage basin included 27.6 million barrels of crude oil, 49.4 billion cubic feet of natural gas, 10.1 million gallons of natural gas liquids, collectively valued at $81.7 million. The output and value of these commodities in the Mississippi and Alabama parts of the Pascagoula River drainage basin are shown in Table 4. Production in the whole drainage basin was from a total of 51 fields scattered through 11 counties in Mississippi and 1 field in Alabama.

Some of the oil produced is refined at plants near Purvis and Lumberton in Lamar County, and Sandersville in Jones County. Most of the oil is transported by pipeline to refineries in Louisiana and near Mobile, Ala. A refinery at Pascagoula, Jackson County, processes crude oil from Louisiana.

Table 4

Oil, gas, and natural gas liquids produced in the Pascagoula River Basin of Mississippi and Alabama, and in the State of Mississippi, 1965

Product	Drainage Basin		Associated Counties 1/		State of Mississippi	
	Quantity	Value (thousand dollars)	Quantity	Value (thousand dollars)	Quantity	Value (thousand dollars)
Crude oil, thousand 42-gallon barrels:						
Mississippi-----	2/20,203	53,376	20,249	53,497	56,183	148,437
Alabama---------	7,391	19,291	7,391	19,291	--------	--------
Total---------	27,594	72,667	27,640	72,788	56,183	148,437
Natural gas, million cubic feet:						
Mississippi-----	2/49,415	8,457	109,504	18,851	166,825	28,861
Natural gas liquids, thousand gallons:						
Mississippi-----	10,058	536	10,058	536	48,732	2,581
Total---------	--------	81,660	------	92,175	------	179,879

1/ Includes numerous oil- and gasfields that are outside the drainage basin in counties that lie partly within the drainage basin.

2/ Sum of production of individual fields compiled from Mississippi State Oil & Gas Board Bull. (25)

Jasper and Jones Counties ranked first and second in the production of crude oil in 1965, with an output of more than 12 million barrels or 43.5 percent of all the oil produced in the Pascagoula River drainage basin. Forrest County had the largest output of gas and natural gas liquids ampng counties within the river basin, amounting to 26.5 billion cubic feet of natural gas and 5.9 million gallons of natural gas liquids. Significant quantities of gas were also obtained in Jasper, Jones, Smith, and Pearl River Counties.

The four most productive oilfields in order of decreasing output were: Heidelberg, Soso, and Bay Springs oilfields in Jasper County, and Bryan oilfield in Jones County. Heidelberg oilfield yielded 3.7 million barrels of oil from four producing formations (25).

Pistol Ridge gasfield in Forrest and Pearl River Counties, Maxie gasfield in Forrest County, Raleigh gasfield in Smith County, and Soso gasfield in Jasper County were the four leading sources of gas in 1965. Pistol Ridge, the largest field, yielded 19.4 billion cubic feet of natural gas (25).

History of Oil and Gas Development

The discovery of gas in Paleozoic rocks, Amory gasfield, Monroe County, in 1926 heralded the start of the petroleum industry in Mississippi (22). Jackson gasfield was discovered in Hinds and Rankin Counties in 1930 and the Tinsley oilfield in Yazoo County in 1939. A single field discovery was made in each year, 1940 and 1941, followed by four discoveries in 1943 and 10 in 1944.

The annual rate of field and pool discoveries fluctuated at a low level until 1950 when 19 new fields and pools were discovered. Other years with relatively high discovery rates, showing the general increase in petroleum activity in the State, are: 1953 - 27 discoveries; 1958 - 37 discoveries; 1959 - 43 discoveries; 1960 - 51 discoveries; 1965 - 51 discoveries. No fewer than 41 discoveries were made in any year between 1960 and 1965.

Specific dates are noteworthy within the history of discovery. Eucutta East oilfield in Wayne County, the first oilfield in the Pascagoula River drainage basin, was discovered in 1943. Previous to 1946, production of oil and gas in Mississippi had been from the Paleozoic rocks in the northeast and strata of Upper Cretaceous and Tertiary age in the southern part of the State. In 1946, oil and gas were found in rocks of Lower Cretaceous age in Adams and Lincoln Counties, and in 1948 in the Pascagoula River drainage basin at Ovett, Jones County. Deep drilling in Tinsley field, Yazoo County, in 1951 discovered gas in the Smackover Formation of Jurassic age.

The search for deeper oil was accelerated in 1956 when six discoveries were made in Lower Cretaceous strata. In 1957, 18 out of 26 Statewide discoveries were in Lower Cretaceous strata, and in 1958, 21 out of 37 were so situated. Oil and gas were discovered by deep drilling in the Cotton Valley Formation of Jurassic age in the Soso oil- and gasfield, Jasper County, in 1958. Six additional discoveries in the Cotton Valley Formation have been made since that time within the Pascagoula River drainage basin (16).

Oil was discovered in the Smackover Formation within the Pascagoula River drainage basin in 1963 at Bienville Forest oilfield, Smith County. Four additional discoveries of oil and gas in the Smackover were made in 1965.

The history of discoveries is reflected to a certain extent in the history of production as shown in Figure 2. Early peak production in 1942 of about 28.8 million barrels valued at $26.6 million reflected the rapid increase and decrease of flush production in Tinsley oilfield (22). At that time, there were about 700 oil and gas wells in the State.

The production peak reached in 1948 was about 45.8 million barrels of oil valued at $110.3 million produced from 1,399 oil and gas wells.

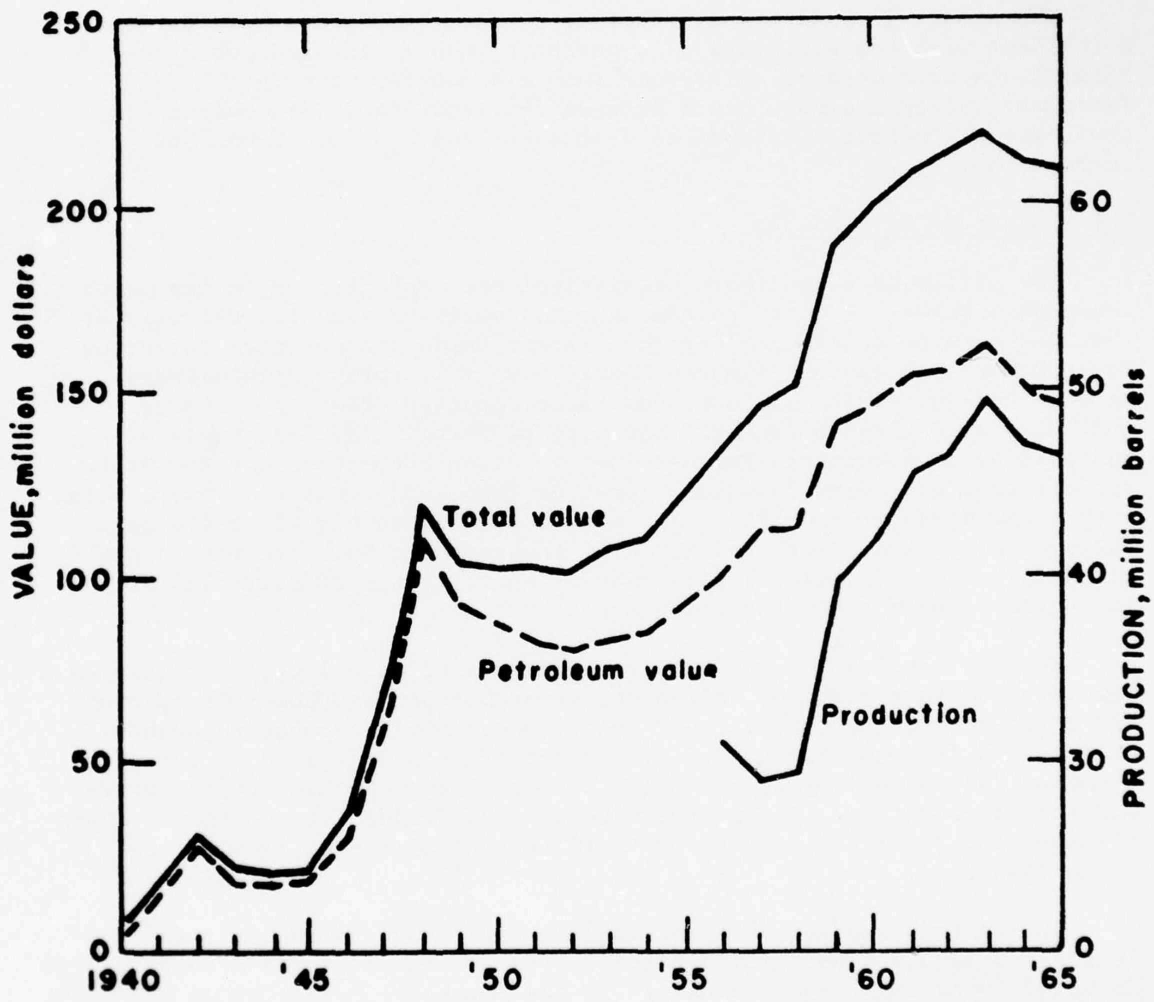

FIGURE 2.-Production and Value of Petroleum and Total Value of Mineral Production in Mississippi.

Conservation laws that went into effect on May 9, 1948 (22), subsequently reduced the annual output of oil despite a continuing increase in the number of oil and gas wells.

The upturn in production, starting in about 1957, was more or less coincident with the discovery of a series of new fields and pools in Lower Cretaceous strata. Fifty-one such discoveries were in the Pascagoula River drainage basin between 1957 and 1960. Discoveries in the Lower Cretaceous continued at a somewhat reduced rate from 1960 through 1965.

The Habitat of Oil and Gas

The oilfields of southern Mississippi are concentrated in two major geographic zones. A northern zone extends westward from the vicinity of the Clarke-Wayne County line at the Alabama border to northern Jefferson Davis County and eastern Simpson County, where it turns northwestward through Rankin, Hinds, Madison, and Yazoo Counties (Fig. 3). A more southerly zone extends from the vicinity of Pistol Ridge and Maxie oil- and gasfields in southern Forrest County west-northwest across the State to Jefferson and Adams Counties. Most of the fields in the northern belt, with a few notable exceptions, lie within the Pascagoula River drainage basin. Only Pistol Ridge and Maxie of the southern belt lie within the drainage basin. Individual oilfields or small groups of oilfields are scattered between these two major zones.

Surface studies and subsurface studies based on oil well drilling have demonstrated that rocks of Paleocene, Upper Cretaceous, Lower Cretaceous, and Jurassic age lie successively deeper under surface rocks throughout most of the drainage basin. The strata are regionally folded to a trough, the East Mississippi syncline, which curves gently through Greene, Perry, and Forrest Counties. The northern belt of oilfields lies on the northern flank of the syncline, and the southern belt of oilfields lies on the south flank.

At least 15 recognized stratigraphic units have yielded oil and gas in the Pascagoula River drainage basin. The youngest strata are the Wilcox Group of Eocene age, and the oldest is the Smackover Formation of Jurassic age. Among the productive formations of Upper Cretaceous age are Selma Chalk, Eutaw, and Tuscaloosa Formations. In the Lower Cretaceous series are the Washita-Fredericksburg Groups, including the Dantzler Formation, Ferry Lake Anhydrite, Rodessa, Pine Island, Sligo, and Hosston Formations. In the Jurassic Series, the Cotton Valley Formation and Smackover Formation yield oil and gas.

The payzones in most of the formations are sandstone. Payzones in the Smackover Formation may be either porous, oolitic limestone, or calcareous sandstone.

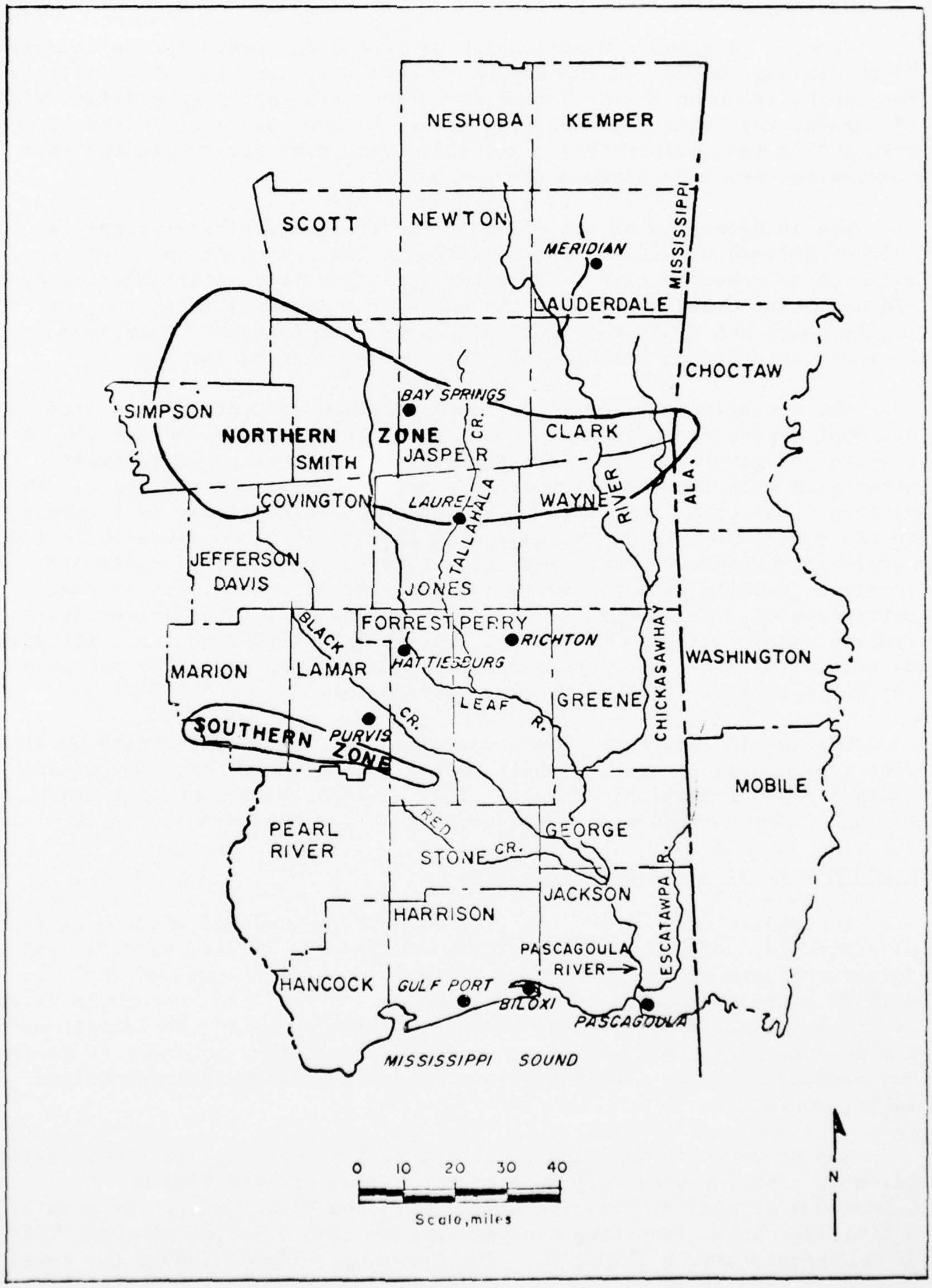

FIGURE 3.- Oil- and Gasfield Zones in The Pascagoula River Study Area.

General geographic distribution of producing strata in the Pascagoula River drainage basin and the depths of encounter are presented in Table 5. The depths at which the producing formations are encountered differ widely throughout the basin. Generally, the depths are shallower in the northern belt and in the southern belt, and relatively much greater in the East Mississippi syncline between the two belts.

The localization of the oil deposits in southern Mississippi is a result of deltaic conditions that existed in the region during Cretaceous and much of Cenozoic time. Rainwater (29) described interfingering marine and nonmarine conditions along the edges of a regional delta that extended to the south and southwest. Brackish water and lagoonal environments commonly occupied an intermediate position separating the two.

The situation was ideal for the generation of hydrocarbons from the abundant organisms in the marine and shelf environments and for the entrapment of generated hydrocarbons in porous and permeable sediments associated with the delta structure. Entrapment of oil and gas was in part on local domes and folds. The folds developed partly in response to the rising of salt domes, beginning some time in the Jurassic Period, partly in response to local irregularities in thickness of sediments inherent in delta growth, and partly as a result of regional folding. Entrapment of oil in some fields is in dipping strata terminated against faults. The continuity of the oil reservoir in fields that are situated on structural domes above buried salt domes is complicated by patterns of faults that are typical of that environment.

Oil is also entrapped where permeable strata are surrounded by otherwise impermeable strata and where wedges of permeable strata terminate updip between impermeable strata. Thus, hydrocarbons migrating updip through the permeable wedge were trapped at the upper end.

Productivity of Stratigraphic Units

In 1965, strata of the Lower Cretaceous yielded 9.9 million barrels of crude oil, Upper Cretaceous strata yielded 6.6 million barrels, and Jurassic strata yielded 2 million barrels out of the total of 20.2 million barrels produced in the Mississippi part of the Pascagoula River drainage basin (Table 6). The Eutaw Formation supplied the largest individual amount of oil and was followed successively, in order of decreasing productivity, by the Rodessa and Paluxy Formations and the Cotton Valley Formation.

Gas produced in the Mississippi part of the Pascagoula River drainage basin in 1965 included 28.8 billion cubic feet derived from Upper Cretaceous strata, 8.9 billion cubic feet from Lower Cretaceous strata, 3.6 billion cubic feet from Cenozoic strata, and 0.7 billion cubic feet from Jurassic strata (Table 6). The Tuscaloosa Formation was the chief source of gas, followed closely by the Eutaw Formation. Washita-Fredericksburg Groups, Wilcox Group, Rodessa Formation, and Paluxy

Table 5

Spatial distribution of oil and gas producing stratigraphic units, 1965

Series	Formation or group	Geographic extent, counties	Shallowest production field, county, approximate (15) depth (feet)	Deepest production field, county, approximate (15) depth (feet)
Cenozoic --------	Wilcox	Forrest and Pearl River	Pistol Ridge-Maxie, Forrest, 4,400	Pistol Ridge-Maxie, Forrest, 4,550
Upper Cretaceous ----	Selma Eutaw Tuscaloosa	Southeast Clarke Clarke, west to Covington, south to Forrest and Pearl River	Junction City, Clarke, 2,950	Pistol Ridge, Forrest, 8,425
Lower Cretaceous ----	Paluxy to Hosston	Clarke, west into Covington, north into Smith, south to Forrest and Pearl River	Paluxy Fm., Yellow Cr. West, Wayne, 7,391	Hosston Fm., Martinville, Simpson, 14,000
Jurassic --------	Cotton Valley	Western Jasper to north-central Wayne	Yellow Cr., Wayne, 11,870	
	Smackover	Southeastern Scott to northeastern Jones. Southwestern Perry		Black Creek, Perry, 19,768

Table 6

Oil and gas production from specified stratigraphic units, Pascagoula River Basin, Mississippi part, 1965[1]

Unit	Crude oil (1,000 barrels)	Natural gas (million cubic feet)
Cenozoic		
Wilcox Group-----	36.3	3,624.4
Upper Cretaceous		
Selma Chalk------	30.8	15.1
Eutaw-----------	5,488.6	12,318.0
Tuscaloosa-------	1,090.3	16,423.5
Total----------	6,609.7	28,756.6
Lower Cretaceous		
Washita-Fredericksburg Groups---------	1,191.0	4,242.8
Paluxy-----------	1,894.1	1,391.7
Mooringsport-----	202.4	40.1
Rodessa----------	3,581.6	2,620.5
Pine Island------	93.3	29.8
Sligo------------	1,508.7	361.4
Hosston----------	672.8	171.3
Undistributed Lower Cretaceous-----	731.3	58.1
Total----------	9,875.2	8,915.7
Jurassic		
Cotton Valley----	1,789.5	643.4
Smackover--------	175.5	75.5
Total---------	1,965.0	718.9
Undistributed--------	1,716.4	7,399.4
Grand total----	20,202.6	49,415.0

1/ Compiled from Mississippi State Oil & Gas Board Bull. (25)

Formation were successively less productive, each yielding not less than 1 billion cubic feet of gas. Other gas-bearing formations individually yielded less than 1 billion cubic feet.

Exploration in 1965

There were 53 exploratory wells drilled in the Pascagoula River drainage basin in 1965. Total depths between 10,000 and 15,000 feet were reached in 29 of these tests; 10 reached depths of 15,000 to 20,000 feet; 1 exceeded 20,000 feet. Tests that bottomed at depths of more than 10,000 feet resulted in 10 oil wells and 1 gas well. All but two of the successful deep wells had payzones at depths greater than 10,000 feet, with the deepest in Perry County producing gas from the Smackover Formation between depths of 19,768 and 20,138 feet (Table 7). The success ratio of tests deeper than 10,000 feet was 1 in 3.33, as in contrast with the success ratio of all exploratory drilling in Mississippi of 1 in 8.63 in 1965 (15).

Resources

Estimates of proved petroleum reserves in Mississippi, as of December 31, 1965, range from 359.8 million barrels, according to the American Petroleum Institute (API) (1) to 531.7 million barrels, according to The Oil & Gas Journal (32).

The Oil & Gas Journal also estimated reserves for 12 of the 16 leading fields in the Mississippi part of the Pascagoula River drainage basin. Reserves in the listed fields, January 1, 1966, totaled 215.9 million barrels, or 40.62 percent of stated total Mississippi reserves. An estimate of total reserves in the oilfields of the Pascagoula River Basin (based on The Oil & Gas Journal figures) in Mississippi was 244.5 million barrels (January 1, 1966). This was 42.2 percent of total Mississippi reserves stated by The Oil & Gas Journal. The ratio of reserves to 1965 production in the Pascagoula River drainage basin was 12.28 to 1.

Applying the same percentage factor of State production to the API figures, the proved crude oil reserves in the Mississippi part of the Pascagoula River drainage basin would be 151.8 million barrels. The ratio of reserves to annual production would be 7.51 to 1, somewhat better than the 6.4 to 1 Statewide ratio.

Reserves of natural gas and natural gas liquids in Mississippi, estimated by API and The Oil & Gas Journal, appear in Table 8. According to Minerals Yearbook, the Statewide ratio of reserves of natural gas to yearly production was 11 to 1 in 1965, and the ratio of reserves of natural gas liquids to 1965 production was 23 to 1. Reserves of natural gas and natural gas liquids in the Pascagoula River drainage basin have not been calculated.

Table 7

Exploratory wells completed in the Pascagoula River drainage basin, 1965

County	Total No. exploratory wells	No. wells, total depth less than 10,000 feet			No. wells, total 10,000-15,000 feet			No. wells, total depth greater than 15,000 feet			Shallowest and deepest producing zones
		Oil	Gas	Dry	Oil	Gas	Dry	Oil	Gas	Dry	
George---	1	---	---	1	---	---	---	---	---	---	----------------
Greene---	2	1	---	---	---	---	---	---	---	1	6,879-85 Eutaw 6,893-95
Jackson--	1	---	---	---	---	---	1	---	---	---	----------------
Jasper---	3	---	---	---	---	---	---	1	---	2	14,532-548 Cotton Valley
Jones----	7	1	---	---	3	---	3	---	---	---	7,242-49 Lower Tuscaloosa 12,750-770 Smackover
Perry----	1	---	---	---	---	---	---	---	1	---	19,768-20,138 Smackover
Simpson--	5	---	---	---	2	---	3	---	---	---	10,386-390 Washita-Fredericksburg 11,494-502 Paluxy
Smith----	10	---	---	---	1	---	4	2	---	3	13,230-240 Cotton Valley 16,080-090 Cotton Valley
Wayne----	23	2	---	8	1	---	11	---	---	1	7,480-88 Lower Tuscaloosa 10,199-202 Hosston
Total--	53	4	---	9	7	---	22	3	1	7	----------------

Source: International Oil Scouts Association (15).

Table 8

Estimated proved recoverable reserves of natural gas liquids and natural gas in Mississippi

Product	API			The Oil & Gas Journal	
	1965 production	Reserves December 31, 1965	Ratio reserves to 1965 production	Reserves January 1, 1966	Ratio reserves to 1965 production
Natural gas--million cubic feet-	166,825	1,973,447	11.8 : 1	2,420,000	14.5 : 1
Natural gas liquids--thousand barrels---	1,160	27,014	23.3 : 1	32,975	28.4 : 1

Source: American Gas Association, American Petroleum Institute, and Canadian Petroleum Institute (1). The Oil & Gas Journal (32).

Outlook

Continued growth in the output of petroleum and natural gas in a given area depends upon a continual replenishment of reserves through an active and successful exploration program for new oilfields and gasfields. Table 9 shows the relationships between reserves, production, and exploration in the State of Mississippi for the years 1956 through 1965.

The rapid upswing in production between the years 1957 and 1960 accompanied a rapid growth in the oil reserves in the State, resulting from extensive successful exploration. Changes in reserves in 1960 were due primarily to the discovery, extension or modification of reserves in amount of 67.9 million barrels of oil, the largest single year's increment of new oil in the 10-year period. Total well completions, total exploratory tests, and the number of successful exploratory tests were greater than in any of the preceding 4 years and the following 2 years.

Since 1960, despite extensive drilling in the State, the discovery of new reserves has been sporadic, and large production of oil from existing fields has lowered total oil reserves to about the level of 1956 and 1957. However, the ratio of reserves-to-annual production was about 9.5 to 1 in 1956-57 whereas in 1965 it was only 6.4 to 1. A further decline of the reserves-to-production ratio augers either a relatively rapid depletion of existing oil reserves or a cut in the absolute annual output of petroleum as a means of extending the life of the known reserves.

The amount of new oil found between 1961 and 1964, as indicated by the column labeled "changes due to discoveries" (Table 9) dropped considerably below the amounts found in the years 1958 through 1960. The upturn in discoveries and reserves in 1965 resulted largely from the discovery of a large oil pool in the Cotton Valley Formation near Bay Springs, Jasper County. Reserves at Bay Springs may be as much as 29.1 million barrels of oil (32). Bay Springs field contains the first large reserves discovered in rocks of Jurassic age in the Pascagoula River drainage basin. The discovery could be the first in a series of oil discoveries in Jurassic rocks, similar to the series of discoveries in rocks of the Lower Cretaceous between 1956 and 1963. Such an oil play would appreciably increase oil reserves to support expansion of output and lengthen the life of oil production.

Exploration, discovery, and development of oil reserves in the Jurassic is handicapped by the great depth to which drilling will have to be extended. The oil is being obtained in the Bay Springs field from depths between 14,487 and 14,614 feet. Oil was also discovered in the Cotton Valley Formation in Pool Creek oilfield, Jones County, at depths between 12,600 and 12,885 feet.

In 1965, the Phillips Petroleum Co. completed a condensate well in the Smackover Formation at depths below 19,768 feet in southwestern Perry County. The product of the well was more than 50 percent hydrogen sulphide.

Table 9

Production, drilling activity, and estimated recoverable reserves of crude oil in Mississippi 1956-65

Year	Production (thousand barrels)	API reserves December 31 (thousand barrels)	Change due to discoveries (thousand barrels)	Ratio reserves to production	No. of completions	No. of exploratory tests completed	No. of successful exploratory tests: Oil	No. of successful exploratory tests: Gas
1956 -------	40,824	368,205	19,553	9.5 : 1	402	201	12	1
1957 -------	38,922	359,550	28,287	9.2 : 1	390	190	10	1
1958 -------	39,512	378,688	57,203	9.6 : 1	423	180	12	1
1959 -------	49,620	389,337	57,980	7.9 : 1	648	269	11	2
1960 -------	51,673	407,098	67,881	7.9 : 1	700	272	20	3
1961 -------	54,688	401,170	47,457	7.3 : 1	607	210	10	---
1962 -------	55,713	388,383	40,684	7.0 : 1	622	230	16	1
1963 -------	58,752	384,909	53,743	6.6 : 1	797	282	16	2
1964 -------	56,777	356,567	27,462	6.3 : 1	819	374	19	1
1965 -------	56,183	359,756	57,896	6.4 : 1	793	340	22	3

Year	Production (thousand barrels)	Oil & Gas J. reserves January 1 (thousand barrels)	Change due to discoveries, revisions, extensions	Ratio reserves to production
1965 -------	56,116	528,000	59,800	-----------
1966 -------	-----------	531,684	------------	9.47 : 1

Sources: American Gas Association, American Petroleum Institute, and Canadian Petroleum Institute (1).
Minerals Yearbook (7).
The Oil & Gas Journal (32).

Parallel to the exploration for oil in the Jurassic will be continued exploration for oil in the Lower Cretaceous of the deeper parts of the East Mississippi syncline. Continued production from these strata is also necessary to maintain high annual output of oil for the next 10 to 15 years. Geologic possibilities exist for extending oil exploration and discovery into southernmost Mississippi in carbonate rocks of Lower Cretaceous age (26, pp. 23-43). Exploration has been insufficient to prove or disprove the potential of this area.

Salt

Extensive beds of salt are present in Jurassic sediments underlying the Smackover Formation throughout the southern half of Mississippi (29, p. 83). Great pillars of salt known as salt domes rise from the salt beds and penetrate overlying strata. Twenty-six domes are known within the Pascagoula River drainage basin. The top of the shallowest is 722 feet below the surface of the earth whereas the top of the salt in the deepest dome was found at 14,075 feet below the surface. Locations and history of the salt domes are given in Table 10.

The salt domes are indirectly of economic significance at the present time as many oilfields and gasfields have developed in the deformed sediments above domes. No direct utilization has been made of the salt as has been done in Alabama, Louisiana, and Texas where salt is mined both by mechanical means and by solution processes. However, caverns which were dissolved in the salt dome at Petal, Forrest County, are used for the storage of liquid petroleum gas.

The future for the utilization of salt in Mississippi is uncertain. In 1964, 66.4 percent of the salt sold or used by producers in the United States went directly into the chemical industry. No such chemical industry exists at the present time in the Pascagoula River drainage basin, except at the city of Pascagoula. By contrast, almost half of the salt produced annually in the United States originates in Texas and Louisiana, and a large part of this salt moves directly from the mines into closely associated chemical plants.

Some economists (18, p. 823) predict that by the year 2000, salt consumption will quadruple that of 1963. It is possible that, with increased demand, salt domes of the Pascagoula River Basin may eventually be mined.

Sand and Gravel

Sand and gravel was the foremost solid mineral product in the Pascagoula River drainage basin in 1965 when the total output was 1.3 million short tons valued at $1.3 million. In the same period, 7.2 million tons of sand and gravel valued at $7.8 million was produced in the State of Mississippi (7).

Table 10

Salt domes in the Pascagoula River drainage basin

County	Dome	Location			Depth to salt, feet	Remarks
		Sec.	T.	R.		
Covington--	Dont	7	8N	14W	2,300	Estimated.
	Dry Creek	21	8N	17W	2,300	Do.
	Eminence	5	7N	14W	2,440	----------------------
	Kola	28	8N	15W	3,048	Partly in Jones County.
	Richmond	20	6N	15W	1,954	----------------------
Forrest----	McLaurin	10	2N	13W	1,933	----------------------
	Petal	25	5N	13W	1,739	----------------------
	Sunrise	8	4N	12W	5,940	----------------------
Greene-----	Byrd	16	3N	7W	2,058	4,200' x 2,700' @ 2,000' subsea contour.
Jasper-----	Heidelberg	36	1N	12E	9,390	----------------------
Jefferson Davis----	Carson	24	7N	18W	3,086	----------------------
Jones------	Centerville	18	8N	13W	3,000	----------------------
	Ellisville	5	7N	8W	14,075	----------------------
	Laurel	1	8N	12W	12,304	----------------------
	Moselle	31	7N	13W	2,300	----------------------
Lamar------	Midway	28	4N	15W	2,522	----------------------
Perry------	Glazier	19	4N	9W	7,685	----------------------
	Ovett	29	6N	11W	13,152	Partly in Jones County.
	Richton	26	5N	10W	722	----------------------
Smith------	Burns	1	3N	7E	11,300	Estimated.
	New Home	5	10N	13W	2,595	----------------------
	Raleigh	17	2N	8E	2,140	----------------------
Wayne	Chaparral	19	10N	6W	13,598	----------------------
	County Line	1	5N	6W	2,170	Partly in Greene County. Estimated 700 acres @ top salt or 1.2 mi. dia.
	Eucutta	12	9N	9W	11,804	----------------------
	Yellow Creek	7	9N	7W	11,422	----------------------

Source: Hawkins, M. E., and C. J. Jirik (13)

The recorded output in the Pascagoula River drainage basin was the product of four commercial concerns and the U. S. Forest Service. The amount of sand and gravel dug locally by county and municipal agencies was not recorded. A summary of annual output and value is given in Table 11.

Forrest, Perry, and Stone Counties, Miss., were the sources of sand and gravel in 1965. Other counties from which sand and gravel was obtained in the preceding 10 years were George, Jefferson Davis, Pearl River, and Smith. The largest output of sand and gravel has been from Hattiesburg, Forrest County. Deposits along Thompson Creek east of Richton in Perry County yielded abundant sand and gravel in the past but less in recent years.

More than 300 locations of sand and gravel pits are shown on available county highway maps and topographic maps in the Mississippi part of the Pascagoula River Basin. The locations include pits such as those at Hattiesburg that have been worked constantly for many years, commercial workings that are operated intermittently when expedient, deposits worked as needed for county and municipal activities, and small pits operated for private use. The majority of pits are among those operated intermittently or for governmental and private use.

Table 11

Sand and gravel production and value, Pascagoula River drainage basin, 1956-65

Year	Quantity (short tons)	Value (dollars)
1956---------------	790,515	644,870
1957---------------	730,300	594,950
1958---------------	1,028,416	718,955
1959---------------	1,052,665	764,990
1960---------------	985,620	419,350
1961---------------	853,852	691,191
1962---------------	1,179,000	1,136,460
1963---------------	1,211,547	1,173,889
1964---------------	1,369,000	1,330,000
1965---------------	1,138,000	1,118,000

Deposits

The southern two-thirds of the Pascagoula River Basin in Mississippi lies within what has been collectively called the Citronelle gravel belt (21). The belt extends east-west across the southern third of Mississippi and northward in a narrow zone in the Western half of Mississippi into

Tennessee. Three distinct environments contain large usable gravel deposits. Ridge tops and interstream divides have a blanket of bedded sand and gravel designated on the State geological map (24) as Citronelle Formation. Many of the streams have relatively broad valleys filled with irregularly stratified alluvium that contains much gravel amidst the preponderant sand and silt. The largest individual gravel pits are in alluvium.

Terraces containing stratified sand and gravel occupy an intermediate position along the valley slopes between the alluvial riverbottoms and the Citronelle-capped divides (12). Some of the terraces are sufficiently low to be flooded intermittently by the streams in the adjacent valley. Others are above maximum flood level.

Many gravel deposits are colluvium. The pebbles have been released from Citronelle gravels or terrace gravels by weathering and erosion, moved downslope from the source under the effects of gravity, and are concentrated locally on the less steeply inclined slopes or local flat surfaces.

All of the sand and gravel deposits are of quartz sand and siliceous pebbles mixed with varying amounts of clay. Pebbles are of chert, flint, jasper, and quartzite. They range in shape from equidimensional to chunky prismatic, and from subangular to subrounded; flat or discoidal pebbles are uncommon. Most of the pebbles are less than 1½ inches in diameter. A regional gradation in the size of the pebbles is apparent from north to south. In the northern part of the basin, very few pebbles are coarser than 1½ inches in diameter. In the southern part of the basin, in Stone County, the average maximum diameter is about 1 inch.[3/]

Size of the gravel deposits ranges widely between environments. The Citronelle gravels contain relatively large quantities of clay that is difficult to wash from the pebbles. Individual deposits of recoverable gravel range from a few acres extent to as much as 20 or 30 acres. Several deposits in northeast Lamar County have been worked by pumping methods, but the smaller ones are dug with a dragline. As much as 150 acres of surface were involved in the recovery of gravel from the individual closely associated deposits. Thicknesses of 30 to 40 feet are not uncommon in the Citronelle.

Terrace deposits are somewhat more continuous than the high gravels. Gravels have been mined almost continuously through a distance of about 2 miles on the east flank of Thompson Creek near Richton in Perry County. The gravels are bedded, contain much less clay than the Citronelle, and are relatively coarser. Most of these deposits were sufficiently large to be minable by pump methods. A few of the smaller deposits were mined

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3/ Lewis, J. D. Personal communication. American Sand and Gravel Co., Hattiesburg, Miss., Oct. 29, 1966.

with bulldozers and draglines. Though the thickness of gravels exposed in the face of abandoned pits is rarely more than 25 feet, there is reason to believe that the gravels extended 25 to 35 feet below their present lowest exposed level.[4/] The mined areas along Thompson Creek probably involve as much as 600 or 700 acres.

The largest and most continuous source of sand and gravel in the Pascagoula River Basin is the alluvium of Bowie River north of Hattiesburg in Forrest County. At the present time, lagoon-like pits in the alluvium, opening to the Bowie River, have an area of 200 to 300 acres. Gravel has been pumped in this riverbottom since the turn of the century, and many of the old pits, probably covering hundreds of acres, have been filled with stored waste sand (12). The gravels are recovered from a zone extending from a few feet above normal river level to about 70 feet below river level. Gravel is relatively abundant, constituting about 30 percent of the total pumped material.[5/]

Mining

Wherever possible, friable deposits consisting of a mixture of sand and gravel are mined by pump methods, regardless of their location on hilltops and terraces or in recent alluvium. Clay gravels used for surfacing rural roads are mined of necessity by dragline, backhoe, front-end loader, and other mechanical equipment. Thick overburden in high gravel deposits and terrace deposits may be removed by dragline and mobile excavation equipment, such as used in road construction. In relatively large ponds developed for pump mining, overburden of as much as 10 to 20 feet may be taken along with underlying gravels and separated by washing.

Alluvial deposits along the Bowie and Leaf Rivers are worked by barge-mounted pumps and suction booms. Eight- to 12-inch pumps, coupled with 10- to 14-inch suction tubes, recover gravel from depths of as much as 70 feet below river level. Individual and tangled logs and trees buried in the original gravel impede the pumping process, but pumping around the edges of the snags eventually frees them.

Most of the sand and gravel, except the clay gravels used for road surfacing, is washed. The process commonly consists of passage through a primary sand separator followed by treatments with a classifier. If clay is abundant as in some high gravels, the clayey fraction is passed through a logwasher before being classified.

The sand and gravel may be pumped from one operation to another; it may be carried on a conveyor belt; or it may be moved by a combination of both methods. In one riverpit, the primary gravels are pumped from

4/ Work cited in footnote 3.
5/ Work cited in footnote 3.

AD-A036 710 FEDERAL WATER POLLUTION CONTROL ADMINISTRATION ATLANTA GA F/G 8/6
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the deposit, passed through a sand separator, carried by conveyor belt to a storage pond, pumped from the storage pond to the classifier, and carried by conveyor belt to the finished product stockpiles.

Utilization or disposal of the sand is one of the principal problems in mining sand and gravel. The gravel in high deposits may comprise less than 10 percent of the deposit. Gravel recovered in some river plants is about 30 percent of all the material moved. The remainder is silt, sand, and minor clay.

Excess sand in hilltop operations is pumped back into the exhausted parts of the pit and retained behind dike structures as a stockpile for possible future utilization. Many riverbottom pits in the vicinity of Hattiesburg have been completely filled with rejected sand, and with scrub growth give the appearance of more or less normal riverbottom. Large piles of sand and some pea gravel are prominent in the abandoned sand and gravel pits in terrace deposits east of Richton.

As with the overburden, rejected sand waste in some deposits has been piled on top of the original ground surface above normally workable gravel deposits. In some instances, the underlying gravel beds are worked by pumping, and the old sand rejects are recycled through the separating system along with the primary sand and gravel. Sand waste piled on the surface has prevented mining of underlying beds in some pits.

Products

Concrete sand and masonry sand to satisfy almost any specifications are available in the Pascagoula River Basin. Clay gravel and washed gravel of all sizes up to 1½ inches are also available. River deposits yield oversize gravels, larger than 1½ inches, only in very small quantities. Oversize aggregate can be supplied only by producers who have built a stockpile over a period of years, or by purchase from sources outside of the basin.[6/] Special gravels for road surfacing with tar are produced by crushing and natural gravels and classifying the crushed product selectively.

Exploration

Geologic maps, local physiography, and shallow drilling are used in exploring for sand and gravel. The extent of the Citronelle blanket on the ridges and interstream divides is shown on the Geologic Map of Mississippi and on geologic maps of individual counties published in bulletins of the Mississippi State Geological Survey. River alluvium has been similarly mapped in Kemper and Forrest Counties. Terrace deposits are shown on the geologic map of Forrest County. In November 1966,

6/ Work cited in footnote 3.

a complete unpublished map of sand and gravel deposits in George County was available at the Mississippi Geological, Economic, and Topographical Survey in Jackson.

Topographic maps published by the U. S. Geological Survey, particularly the 7½-minute quadrangle sheets published since 1960, show the locations of numerous sand and gravel pits, and quite clearly depict the alluvial riverbottoms and more prominent adjacent terraces. Riverbottoms and terraces are distinctly shown on aerial photographs. Electrical techniques and drilling are employed in field exploration. Churn drills and truck-mounted auger drills are commonly employed. Alluvium is tested to 60 to 80 feet below the surface by auger drilling.

Resources

No adequate estimate of the amount of available sand and gravel in the Pascagoula River drainage basin has been published. An estimate of the amount of sand and gravel in the Citronelle Formation can be made from the geologic map by making certain assumptions. About 1,380 square miles of surface in the Pascagoula River drainage basin is shown bearing Citronelle sediments on the Geologic Map of Mississippi (24). Granting the arbitrary assumption that workable sand and gravel beds 20 feet thick are scattered over one-tenth of the area of outcrop of the Citronelle and that gravel constitutes 20 percent of the workable beds, about 3.8 billion tons of sand and gravel in the form of workable beds would contain 769 million tons of gravel. The amount of sand and gravel contained in the terrace deposits and in the river alluvium within the drainage basin cannot be so estimated, for neither type of deposit has been mapped consistently or tested systematically for thickness. It is a logical conclusion that the resources are large and probably measurable in billions of tons. Washed sand used to fill riverbottom pits near Hattiesburg amounts to many million tons (12, p. 32).

Quality

The chert gravels and silica sand available do not display uniform strength characteristics required in fine and coarse aggregate for construction. Some of the chert gravels fail to meet the magnesium-sulfate test, and some sand fails to meet constructional specifications. In some deposits, neither sand nor pebbles are sound; in others, either the sand or the pebbles may be unsound; and in still others, both products are completely satisfactory. The cause of unsoundness of the pebbles is unknown, but it is commonly postulated to be a result of weathering.

The general absence of pebbles of more than 1½-inches diameter limits the use of the native gravel in some heavy construction. Natural sand used as fine aggregate also fails to meet some of the more rigid specifications for certain types of construction. Producers have eradicated this difficulty by the general use of sand classifiers that yield products to satisfy most specifications.

Markets

Sand and gravel produced within the basin are marketed in the basin from Meridian in the north southward to the gulf coast and including the towns of Pascagoula and Biloxi. Some sand and gravel is shipped as far as New Orleans. Except for sand and gravel used locally in the vicinity of the pit, shipment is by rail.

Outlook

A mineral supply study for the Pascagoula River Basin navigation area (10) postulated growth of the sand and gravel output in the area at a rate of 5 percent per year. A similar study for the Pearl River (2) questioned the applicability of the 5 percent growth rate to the sand and gravel industry of southern Mississippi and offered a supplementary projected output at 2 percent per year as a minimum rate of growth. A similar projection of output at a minimum growth rate of 2 percent per year is recommended for the Pascagoula River drainage basin.

The opinions of producers and transporters seem to indicate that growth of the industry will be linked to growth of the basin population and economy. Producers do not anticipate shipment to distant markets. Barge line operators do not anticipate local shipping as truck and rail are more effective for such traffic. Barge operators also do not anticipate much long distance hauling of sand and gravel because, even at relatively low barge rates, it is difficult to meet the combination of low rail rates on sand and gravel and the flexibility of delivery offered by rail.

A third factor suggests that expansion of the sand and gravel industry will depend mostly on intrabasin development. The sand and gravel industry in the Pascagoula Basin is hemmed for markets between the Mobile, Ala., and lower Pearl River - Tangipahoa, Mississippi and Louisiana, sand and gravel industries.

Stone

The only stone produced in the Pascagoula River Basin in 1965 was limestone in Smith County. Total output was 12,000 tons valued at $24,000. The limestone is crushed at a plant at Bay Springs, Jasper County, for use as a soil conditioner. Stone is obtained from strata of the Vicksburg Group which extends across the State in an irregular outcrop from the vicinity of Vicksburg on the Mississippi River east-southeast to the Mississippi-Alabama State line in Wayne County. In Rankin and Warren Counties outside the Pascagoula Basin, limestone and marl of the Vicksburg Group are the raw materials used in manufacturing cement.

The limestone is commonly associated with calcareous marl. Analyses (21) of the limestone and marl reveal as much as 93.8 percent calcium carbonate. A total of 17 analyses of rock samples collected from various places in Smith, Jasper, and Wayne Counties was published by Mellen (21)

and Crider (8). The minimum calcium-carbonate content shown by these analyses was 70.81 percent and an average of the 17 was 81.53 percent. Mellen (21, p. 19) reported 13 feet of marl and limestone containing more than 80 percent calcium carbonate in one locality in Smith County. The thinnest reported section was 7½ feet thick.

Variation in calcium-carbonate content, relatively small resources of some of the deposits, relative thinness of beds and thickness of overburden, and the necessity of disintegrating some of the marl mechanically and crushing the limestone are some of the deterrents in using calcareous stone of the Vicksburg Group for cement and agricultural purposes.

Extensive chalk is available in Upper Cretaceous strata in northeastern Mississippi. Prairie Bluff Chalk of the Upper Cretaceous is exposed in northeasternmost Kemper County. Mellen (21, p. 17) reported 77.56 percent calcium carbonate in this formation. Crider (8) reported as much as 82.47 percent calcium carbonate in chalk from Kemper County. The chalk deposits are outside the limits of the Pascagoula River drainage basin.

No commercial production of building stone is known within the Pascagoula River drainage basin. Logan (19) called attention to the possible usefulness of limestone in the Clayton Formation, Midway Group, as a building stone. Hard limestone of the Vicksburg Group has also been used for construction purposes locally (8, p. 52). Some sandstone, among which is that of the Clayton Formation of the Midway, the Tallahatta Formation of the Eocene, and the Catahoula Sandstone of the Miocene, is locally sufficiently indurated to be used as building stone. The Clayton is exposed locally in northeastern Kemper County. An irregular belt of outcrop of the Tallahatta Formation extends from the State line, eastern Clarke County, northwestward through Lauderdale, Newton, and Neshoba Counties and beyond the Pascagoula River Basin. The Catahoula Sandstone extends across the basin from eastern Wayne County to northwestern Smith County.

Miscellaneous Substances

Three substances, whose annual output and value cannot be revealed, are produced locally within the Pascagoula River drainage basin. Lime and magnesium compounds are made from dolomite and seawater by the H. K. Porter Co., Inc., Pascagoula (7). Dolomite is obtained in Alabama outside the Pascagoula Basin. The substances are used in manufacturing refractories.

Sulfur is recovered from refinery gases at a refinery near Purvis, Lamar County (7). A deep condensate discovery (1965) in the Smackover Formation, Black Creek field, Perry County, yielded gas with high hydrogen-sulfide content (7). As sulfur is being successfully recovered from condensate obtained from the Smackover Formation in Madison County, the Perry County discovery may presage an expanded sulfur industry in the Pascagoula Basin.

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